ConocoPhillips Portland Terminal
Source Control Evaluation Report
DRAFT

Site Location:
ConocoPhillips Portland Terminal
5528 NW Doane Avenue
Portland, OR 97210

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Executive Summary

On behalf of the ConocoPhillips Company (ConocoPhillips), Stantec Consulting Corporation (Stantec) has prepared this Source Control Evaluation (SCE) Report for the ConocoPhillips Portland Terminal (RM&R 0922), located at 5528 NW Doane Avenue in Portland, Oregon (the Site).

The objective of the SCE Report is to evaluate the existing stormwater controls at the Site and to determine whether additional source control measures are necessary to prevent impacts to the water or sediment quality of the Willamette River. The SCE evaluates releases or potential releases against their likely or reasonable current or future adverse effects against the water or sediment quality of the Willamette River. Site specific upland sources with complete transport pathways to the Willamette River are screened against Joint Source Control Strategy (JSCS) screening level values (SLVs).

The Oregon Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA) have identified the following pathways by which the Willamette River and associated aquatic sediments have been impacted by upland chemicals of interest (COIs):

- **Direct Discharge**. The direct discharge pathway includes permitted discharges such as commercial, industrial, private, or municipal outfalls, including permitted discharges such as industrial and stormwater runoff.
- **Groundwater**. The groundwater pathway includes discharge via sediments, bank seeps, or infiltration into storm drain pipes that discharge to the Willamette River.
- **Overland Transport Sheet Flow**. The overland transport pathway includes the uncontrolled flow of water from a site to the Willamette River.
- **Erosion**. The erosion pathway includes river bank soil, contaminated fill, waste piles, landfills, and surface impoundments that release contaminants directly to the Portland Harbor Superfund Site through soil erosion.
- **Overwater Activities**. The overwater activity pathway includes contamination from overwater activities at riverside docks, wharves, or piers; discharges from vessels; and fuel releases.

The following migration pathways are complete for the site:

- **Direct Discharge/Stormwater Pathway**. Under an industrial National Pollutant Discharge Elimination System (NPDES) permit, stormwater is discharged from the site and flows to one of sixifferent outfalls that ultimately discharge to the Willamette River.

- **Groundwater**. The deep groundwater pathway is being evaluated separately for the Willbridge Terminal Groups. However, shallow groundwater via infiltration to the storm drain system is a complete pathway and is included in this SCE.

As part of the Source Control Evaluation, existing documents, reports, and records were reviewed and additional stormwater and catch basin analyses were completed. Review of existing records included items such as Site features, the storm drain system, historic and current operations, materials used on site, existing best management practices, and groundwater data analysis.

The conclusion of the Source Control Evaluation is that the site is not a significant source of contamination to the Willamette River. The primary constituents of potential concern include metals [arsenic, cadmium, copper, lead, and zinc], four polynuclear aromatic hydrocarbons (PAHs) [benzo(b)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and chrysene], and one phthalate [bis(2-ethylhexyl)phthalate].

The facility has an NPDES General Permit for Industrial Stormwater Discharges, 1200-Z General Permit and is in full compliance with the Permit. In addition to continuing to implement the Best Management Practices identified in the Storm Water Pollution Control Plan being implemented as part of the Permit, additional practices are recommended to further reduce and/or eliminate upland sources. These additional practices include:

- Dry weather screening of the storm drainage system on Site
- Additional documentation and set schedules for street sweeping

Table of Contents

Table of Contents

Table of Contents

List of Figures

List of Tables

List of Appendices

Table of Contents

List of Acronyms

AST	aboveground storage tank
BES	Portland Bureau of Environmental Services
bgs	below ground surface
BMP	Best Management Practice
BTEX	benzene, toluene, ethylbenzene, and xylenes
CB	Catch Basin
CO	Consent Order
COI	Chemical of Interest
COPC	Chemical of Potential Concern
DAF	Diffused Air Flotation
DEQ	Oregon Department of Environmental Quality
EPA	United States Environmental Protection Agency
GWET	Groundwater Extraction Treatment
IWD	Industrial Waste Discharge
KHM	KHM Environmental Management Inc.
KMLT	Kinder Morgan Liquid Terminals LLC
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MH	Manhole
ND	Not detected
NPDES	National Pollutant Discharge Elimination System
NW	Northwest
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RES	Riedel Environmental Services
RFO	Reprocessed Fuel Oil
RM	River mile

Table of Contents

RCRA	Resource Conservation and Recovery Act
RES	Riedel Environmental Services
RI/FS	remedial investigation/feasibility study
SCE	Source Control Evaluation
SLV	screening level value
SPCC	Spill Prevention Control and Countermeasure Plan
SPH	separate phase hydrocarbon
SWPCP	Stormwater Pollution Control Plan
SVOC	semivolatile organic compounds
TPH	total petroleum hydrocarbon
TPH-D	total petroleum hydrocarbons as diesel
TPH-O	total petroleum hydrocarbons as heavy oil
TSS	total suspended solid
ug/L	micrograms per liter
UST	underground storage tank
VOC	volatile organic compound
WTG	Willbridge Terminals Group

1.0 Introduction

On behalf of the ConocoPhillips Company (ConocoPhillips), Stantec Consulting Corporation (Stantec) has prepared this Source Control Evaluation (SCE) Report for the ConocoPhillips Portland Terminal, located at 5528 NW Doane Avenue in Portland, Oregon (the Site). This SCE was performed in response to a request by the Oregon Department of Environmental Quality (DEQ) to identify, evaluate, and control sources of contamination that may reach the Willamette River in a manner consistent with the DEQ's *Guidance for Evaluating the Stormwater Pathway at Upland Sites* (DEQ 2009) and the Portland Harbor Joint Source Control Strategy (JSCS).

1.1 PURPOSE

The objective of the SCE Report is to evaluate the existing stormwater controls at the Site and to determine whether additional source control measures are necessary to prevent impacts to the water or sediment quality of the Willamette River. The SCE evaluates releases or potential releases against their likely or reasonable current or future adverse effects against the water or sediment quality of the Willamette River. Site specific upland sources with complete transport pathways to the Willamette River are screened against JSCS screening level values (SLVs). If the SLVs are exceeded for a particular constituent then further evaluation of the need for source control is addressed using a weight of evidence approach.

1.2 REGULATORY FRAMEWORK

Chevron Products Company (Chevron), Unocal Oil Company (Unocal), and Shell Oil Products Company (Shell) were required by the DEQ to perform a Remedial Investigation (RI) and Feasibility Study (FS) for the Willbridge Bulk Fuels Area as part of Consent Order WMCSR-NWR-94-06. The Consent Order (CO) was signed by DEQ, Chevron, Shell, and Unocal on April 6, 1994. When the CO was signed, the Willbridge Facility was composed of the Chevron Willbridge Light Products Terminal, the Unocal Portland Terminal, and the Shell Willbridge Plant. Following signing of the CO, control of the Shell Willbridge Plant was transferred to GATX Terminals Corporation (GATX) by sale agreement on November 23, 1994, with Shell retaining a portion of the environmental responsibility for the Terminal. On March 1, 2003, the GATX terminal was sold to Kinder Morgan Liquid Terminals LLC (KMLT). Control of the Unocal Portland Terminal was transferred to Tosco Refining Company (Tosco) by sale agreement on March 31, 1997, with Tosco assuming remedial responsibility for the Terminal and Unocal retaining environmental liability. Subsequently, the Tosco facility was purchased by Phillips Petroleum Company on September 18, 2001. Phillips Petroleum Company and Conoco, Inc. subsequently merged on September 1, 2002 forming ConocoPhillips, which is now responsible for the remediation of the former Unocal terminal. ConocoPhillips, Chevron, and KMLT are working together to complete the RI/FS in their portion of the Willbridge Bulk Fuels Facility Area and collectively referred to as Willbridge Terminals Group (WTG).

During December 2000, the Portland Harbor was added to the National Priorities List (NPL). The final NPL listing specifies that the United States Environmental Protection Agency (EPA) Region IX is the lead agency for the in-water portion of the remedial investigation and feasibility studies, while DEQ is the lead agency for the upland portions including the area known as the Willbridge Terminals Group which includes the Site.

The DEQ published a Milestone Report in September 2008, which prioritized sites located within the Portland Harbor that are undergoing source control evaluations. The ConocoPhillips Portland Terminal was identified as a “high-priority” site. “High-priority” sites are described in the JSCS as follows ”*A high-priority site will typically be defined as having an ongoing source of contamination that significantly exceeds an SLV at the point of discharge to the river or represent an imminent and substantial threat to human health or the environment, based on a consideration of site specific information. High-priority sites identified by the DEQ and EPA must move forward with aggressive evaluation of pathway specific source control measures and source control implementation as deemed necessary by DEQ and EPA.*” The “high-priority” listing was limited in the JSCS to stormwater sources.

Consistent with the JSCS developed jointly by DEQ and EPA in December 2005, identification and mitigation of upland sources of contamination to the Willamette River and associated aquatic sediments are required to facilitate future cleanup actions in the Portland Harbor. As the lead agency for upland sources, DEQ requested each WTG company to complete a comprehensive Source Control Evaluation (SCE) Report to identify and screen potential chemicals of interest that may be entering the waters of the Willamette River and associated sediments via complete mass transport pathways.

1.3 REPORT ORGANIZATION

- Section 2 – Site Description and History. This section includes: location, topography, groundwater elevations, description of infrastructure both surface and subsurface, description of the Site stormwater conveyance system, historical and current operations, identification of potential upland contaminant sources, contaminants of interest, potentially contaminated media, management practices, and contaminant migration pathways.

- Section 3 – Regulatory History. This section includes: descriptions of regulated tanks, hazardous waste management, permits, violations, pollution complaints and spills, and cleanup status.

- Section 4 – Source Control Evaluation. This section includes a conceptual model and a description of the source evaluation strategy based on the understanding of that conceptual model.

- Section 5 – Source Control Effectiveness and Recommendations. This section includes recommended source control decision and additional recommendations for implementation.

- Section 6 – References. This section includes details of documents referenced in the text of this SCE Report.

1.4 SUMMARY OF EXISTING REPORTS AND OTHER BACKGROUND INFORMATION

1.4.1 Doane Avenue

DEQ records indicate that a historical 27-inch wood stave storm sewer in Doane Avenue between the Chevron and Unocal (now ConocoPhillips) terminals had been impacted by hydrocarbons via groundwater infiltration since at least the early 1970s. The old storm sewer was found to have cracks and deteriorated joints which allowed hydrocarbon and groundwater infiltration. The leaks to the storm sewer created hydrocarbon discharges at the outfall at the Willamette River.

Between 1975 and the early 1980s, Chevron voluntarily pumped accumulated petroleum product from a depression in the old Doane Avenue storm sewer where piping dipped under NW Front Avenue. Chevron also pumped accumulated hydrocarbon from a boom containment area installed downstream from the old storm sewer outfall. The pumping continued until the new Doane Avenue storm sewer was completed in 1982. The old storm sewer was filled with concrete in 1982, and petroleum migration to the river via the storm sewer was reportedly eliminated.

DEQ records report that approximately 9,000 gallons of petroleum product were recovered from the boom containment area between 1974 and 1978, and an “even greater” volume removed from the old storm sewer under NW Front Avenue.

The records also indicate that the Willamette River has received discharges of hydrocarbons from various locations along the riverbank in the vicinity of the Chevron and Unocal docks. A hydrocarbon discharge to the river immediately downstream from the ConocoPhillips dock was specifically reported by the US Coast Guard in January 1982. Following this release detection, IT Envirosciences was contracted by Chevron and Unocal to investigate the subsurface soils and groundwater in the riverbank area between the Chevron and Unocal docks.

1.4.2 Groundwater

In April 1982, IT Envirosciences coordinated the installation of eighteen 2-inch groundwater monitoring wells between the Willamette River, NW Front Avenue, and the Chevron and Unocal docks. During this phase of investigation, hydrocarbons were encountered in sandy fill soils throughout the study area. The fill soils were present above a silty alluvium located at 21 to 26 feet below ground surface (bgs) in the area. Groundwater was encountered at 14 to 18 feet bgs. Floating hydrocarbon product thicknesses in the wells were measured at only approximately 0.1 inch.

The April 1982 study concluded that local groundwater flow was to the southeast, and that the source of the hydrocarbon release was outside of the study area, on the other side of NW Front Avenue. The study also concluded that the Shell Oil Company terminal northwest of Chevron may be a significant source of the identified release.

In July 1982, IT Envirosciences coordinated the additional installation of thirteen 2-inch and two 10-inch groundwater monitoring wells in the original study area and along the southwest side of NW Front Avenue. The goals of the follow-up study included determining the influence of the “new” storm sewer on groundwater flow and further defining pre-fill topography.

A significant conclusion of the July 1982 work was the discovery that the backfill around the “new” storm sewer had a major influence as a drain for the area, and would be the most likely path for future hydrocarbon migration from the Unocal terminal. No groundwater influence related to the old storm sewer was observed. Later studies by Riedel Environmental Services (RES) confirmed that the new sewer had breached a naturally occurring silt dike which had formally acted as a dam to the historic Kittridge Lake. The studies indicated that the new sewer breach had allowed hydrocarbons to migrate through the coarse sewer backfill to the river.

Another conclusion from the follow-up IT Envirosciences study was the discovery of a pre-fill subsurface channel running from west to east across the Chevron waterfront. The channel was believed to have been cut by a stream since a subsurface pre-fill ridge is apparent on both sides of the channel. This channel was later shown to be the historic Holbrook Slough which drained Holbrook Slough Lake and Kittridge Lake.

Oily soil and a light sheen of hydrocarbon on groundwater samples were observed in all of the IT Envirosciences monitoring wells. However, no significant quantity of non-aqueous phase hydrocarbon was discovered in any of the wells. Free product measurements did not exceed 0.2 inch.

In a November 1982 report, IT Envirosciences recommended using the existing 10-inch well (B-33) located in middle of the pre-fill channel for one of three recovery wells. The other two wells would be installed along the axes of the new and old sewer lines.

IT Envirosciences coordinated the installation of eight additional groundwater monitoring wells in the dock area during March 1983. Two additional 10-inch recovery wells were installed in 1984 at the axes of the new and old sewer lines. The two new recovery wells installed by IT Envirosciences were referred to as the “Union 76 Western Well” and the “Union 76 Eastern Well.” The previously installed recovery well located in the middle of the pre-fill channel was referred to as the “Chevron Well.”

The IT Envirosciences recovery wells were found to have limited success in recovering free product from the aquifer. The wells had smaller radii of influence (8 to 14 feet actual versus 85 feet predicted), with limited drawdown. The wells did not produce significant quantities of petroleum product.

In 1984, RES installed twelve 2-inch groundwater monitoring wells in the Chevron Main Tank Yard, Dock Tank Yard, Small Tank Yard, and south Truck Loading Racks area. RES indicated that local groundwater flow was actually to the northeast based on monitoring the combined well field.

During this time period, RES researched additional information regarding the geological and physiogeographical history of the Site. RES reported that the Willbridge site is located on dredged fill material obtained from dredging the adjacent Willamette River. The dredged material was used to fill former lakes in the area from the early 1900s to the 1940s. Doanes Lake was located immediately northwest of the Site and Kittridge Lake was located below and southeast of the Site. A smaller lake, Holbrook Slough Lake, was later shown to also be located in the immediate area. In addition to the lakes, a slough called Holbrook Slough was located between the lakes and the river. The slough is the pre-fill channel identified by IT Envirosciences in the 1982 studies. The slough drained Kittridge Lake and Holbrook Slough Lake.

RES reported that the upper land consists of up to 35 feet of fine- to medium-grained, silty-sandy river dredgings. The fill overlies the original surface of lake bottom sediments, marsh silts, and silty clays. RES further reported that the overlying layer of river dredge sand is generally homogeneous, with occasional silt and clay lenses. The lenses are not believed to have any apparent effect on local groundwater flow. The unconfined, homogenous aquifer located within the fill formation is reportedly 8 to 10 feet in average thickness and overlies the former lake bottom silt and clayey silt aquitard.

In early 1985, RES installed four 4-inch groundwater monitoring wells at the intersection of NW Doane and NW Front to provide additional data for the installation of a new recovery well. These wells indicated that significant free hydrocarbon product was present on the water table. In June 1985, RES completed the installation of a 12-inch recovery well at the intersection of NW Doane and NW Front. The well was reportedly effective in recovering hydrocarbon through the remainder of 1985, but was shut down from November 1985 to March 1986 due to periodic freezing weather conditions. After the recovery well was reestablished in 1986, product recovery was found to be limited. RES concluded that the coarse gravel pack of the new storm sewer was effectively collecting hydrocarbon in the vicinity of the sewer, and channeling hydrocarbons away from the RES recovery well. Up to 6 feet of petroleum product was measured in a monitoring well immediately adjacent, and potentially within, the storm sewer gravel pack (U-4). RES recommended comparing the oil found in the RES recovery well, U-4, and the old and new storm sewer outlets. RES noted that the hydrocarbon in U-4 and the new storm sewer discharge was lighter in color and less viscous than the hydrocarbon observed in the RES recovery well and the old storm sewer discharge. RES further recommended that a new recovery well be drilled in the new sewer bedding material, about 15 feet north of the existing RES recovery well. RES also recommended installing an additional groundwater monitoring well at the intersection of the new storm sewer and the pre-fill silt dike. This well would be evaluated for a potential recovery well location.

RES concluded that four locations of product accumulation existed at the site. The largest pool of product was located at U-4 in the intersection of NW Doane and NW Front. As noted above, up to 6 feet of product was detected in this well. Another pool of product was located at CR-10 in a pre-fill basin in the southwest end of Chevron's Main Tank Yard. A third pool of product was detected at B-33 in the pre-fill channel in Chevron's dock area. A fourth pool of product was detected at B-1 in the old storm sewer backfill.

In January 1987, RES proposed the construction of a clay barrier along the new storm sewer to aid in the recovery of liquid hydrocarbon from the water table and migration seeps to the Willamette River. The clay barrier was completed in September 1987. In addition to the barrier, a new recovery well was installed immediately adjacent to the storm sewer pipe at the barrier wall. Product recovery was initiated in November 1987. During the first three months of operation, approximately 1,000 gallons of petroleum product was recovered. Following installation of the clay barrier, no seepage was observed at the storm sewer outfall.

RES measurements of the combined well system in 1987 showed a hydrocarbon plume generally following the local groundwater gradient. The down gradient two-thirds of the plume follow NW Doane and the new sewer system. The up gradient third of the plume is a west-east lobe extending across the southern corner of the Chevron Main Tank farm.

In May 1988, RES proposed the construction of an intercept trench along the beach line between the Chevron and Unocal loading docks. RES had determined that hydrocarbon product was continuing to follow the historical Holbrook Slough drainage channel. The trench was installed in the fall of 1988. A wet well was installed within the intercept trench to allow trapped hydrocarbons to be removed from the area. No seepage was detected passing through the trench following installation. However, RES noted that slight seepage was visible beyond the downstream edge of the trench.

RES reported that during 1988, approximately 2,000 gallons of additional petroleum product was recovered from the recovery well adjacent to the new storm sewer clay barrier. However, an increased volume of product was observed behind the clay barrier. The increased volume from the 1987 data was not believed to be related to additional releases of hydrocarbon product. A total of several hundred gallons of product was reported to have been pumped from the old RES recovery well at the intersection of NW Doane and NW Front. RES further reported that the hydrocarbon product plume remained similar in shape to that reported in 1987. Product pools were still identified near the intersection of NW Doane and NW Front, and at the clay barrier in the new storm sewer.

In 1989, approximately 500 gallons of product were recovered. RES reported that the hydrocarbon product plume remained similar in shape to that reported in 1988. Product pools were still identified near the intersection of NW Doane and NW Front, and at the clay barrier in the new storm sewer. Increased product pooling was reported near CR-10 at the southwest end of the Chevron Main Tank Yard. Through ASTM-D2887 simulated distillation testing, RES concluded that the primary hydrocarbon plume is #2 diesel fuel. In addition to the diesel fuel, gasoline was reportedly detected on the southwest side of NW Front, adjacent to Unocal's Gasoline Tank Farm. Fuel oil was reportedly detected at the southwest end of Chevron's Main Tank Farm.

RES has continued to monitor the Site, including the operation of the three product recovery areas (Holbrook Slough trench wet well, intersection of NW Doane and NW Front recovery well, and new storm sewer clay barrier). Several hundred additional gallons of product were recovered in 1990 through 1992. Hydraulic gradients and hydrocarbon plume locations have remained relatively constant throughout this period.

In addition to the RES monitoring, Delta Environmental Consultants, Inc. (Delta) has conducted water level monitoring of 27 of the groundwater wells and sampling of 10 of the wells. Water from the 10 wells selected for sampling in a March 1993 event was analyzed for benzene, toluene, ethylene, and xylene (BTEX) by EPA Method 8020. Delta results showed a north to northwesterly groundwater gradient generally consistent with RES measurements. Benzene levels of up to 540 mg/L were detected down gradient of Chevron's Main Tank Farm and in the Chevron Dock Tank Yard. Benzene levels above Safe Drinking Water Act maximum contaminant levels (MCLs) were detected in four of the 10 wells sampled. No toluene, ethylbenzene, or xylenes were detected above their respective MCLs.

2.0 Site Description and History

2.1 SITE DESCRIPTION

The Portland Harbor Superfund Site is an approximate 12-mile stretch of the Willamette River extending from downtown Portland to the confluence of the Columbia River that has been heavily developed by various industries over the past century. The ConocoPhillips Terminal is situated within this stretch of the Willamette River and is part of the Willbridge Bulk Fuels Facility Area.

The ConocoPhillips Portland Terminal (the Site) is located at 5528 NW Doane Avenue in Portland, Multnomah County, Oregon (**Figure 1**). The approximately 30-acre Site is situated on the west bank of the Willamette River at River Mile (RM) 7.8, within the boundaries of the Portland Harbor Superfund Site study area. Overall, the Site topography slopes north-northeast towards the Willamette River.

2.1.1 Physical Plant Description

The ConocoPhillips Terminal is a bulk storage and distribution facility for finished petroleum products and lubricant oils. The lubricants plant also performs blending and packaging operations at the facility. Major components of the Terminal include product storage tanks, product transfer systems, a marine dock, a lubricants blending and packaging facility, and related maintenance facilities.

The Terminal's petroleum product storage consists of 102 active and 15 out of service aboveground storage tanks (ASTs) situated in six tank farms, three refined product/additive tank farms (i.e., Tank Farm 1, Tank Farm 2, and Tank Farm 3) and three lube oil tank farms (Lower Lube Cell, Upper Lube Cell, and Tank Farm F). These features are shown on **Figure 3**. The ASTs are welded and riveted steel construction and contain different grades of gasoline products, diesel and biodiesel fuels, heating oil, black oil, lube oil and lube blend/base stocks, reprocessed fuel oil (RFO), additives, ethanol, slop oil, and transmix. The maximum total capacity of the tanks is approximately 768,416 barrels (32,273,475 gallons) with the capacity of the largest tank being approximately 82,517 barrels (3,450,580 gallons). A complete listing of tanks and their respective contents is provided in **Table 1**. The Terminal also has two 5,000-gallon underground storage tanks (USTs) that store slop oils and flush oils and are located beneath the materials testing laboratory.

The Terminal also has two underground storage tanks (USTs) associated with the lubricants plant. Several other USTs were removed from the Terminal during 1997 (AMEC 2009).

These features are shown on the site plan included as **Figure 2**. A complete list of tanks and their respective contents is provided in **Table 1**.

2.1.2 Site Ownership and Operational History

The ConocoPhillips Terminal manages a variety of petroleum products, including gasoline, diesel, fuel oils and lubrication oils. Petroleum-handling operations at the ConocoPhillips Terminal began in 1908. The Terminal also produced asphalt from 1968 to 1975.

2.1.3 Site Geology and Hydrology

Depths to water range generally from about 4 to 22 feet bgs, corresponding to water level elevations from about 20 to 35 feet mean sea level (MSL) (City of Portland datum). The direction of shallow groundwater flow beneath the site is generally to the northeast towards the Willamette River at an average gradient of about 0.01 foot/foot. Using the typical gradient of 0.01 foot/foot, and typical values for the effective porosity (40 percent) and hydraulic conductivity (35 feet per day), the flow velocity within the upper sandy fill material is estimated to be about 300 to 400 feet per year.

2.1.4 Site Features

The main Terminal area has an estimated 870,000 square feet of surface area. In addition, the Terminal leases approximately 117,000 square feet of property along the Willamette River from the Port of Portland for the marine dock. An estimated 41 percent of the main Terminal area is relatively impervious (AMEC 2009) to infiltration (asphalt concrete, concrete, or tops of buildings/structures); the remainder is predominantly gravel or earth. An estimated 20 percent of the riverfront area is relatively impervious (AMEC 2009) to infiltration (asphalt concrete, concrete, or tops of buildings/structures); the remainder is predominantly gravel or earth.

An estimated 75% of the Site's main Terminal stormwater runoff discharges to the City of Portland municipal storm system which flows to the Willamette River. Stormwater drains to the municipal storm system from one of three site stormwater oil/water separators: Separators #001, #002, and #004. Each of these separators is a stormwater monitoring outfall for purposes of the NPDES permit. Separator 001 drains to the municipal storm system which eventually drains to the Willamette River at the Kittridge Avenue outfall (City of Portland Outfall 19). Separators #002 and #004 drain to the municipal storm system which eventually drains to the Willamette River at the Doane Avenue outfall (City of Portland Outfall 22). Drainage conveyance lines to these two Willamette River outfalls are illustrated on **Figure 3**.

The remaining estimated 25% of the Site's main Terminal stormwater is managed by the process water system where it is treated by an oil/water separator (Separator 003) and diffused air flotation (DAF) hydrocleaner before being discharged to the City of Portland sanitary sewer system. However, SEP-003 is also connected to the storm drain system by a valve that is maintained in the closed condition. Included in the 25% of stormwater treated by the process water system is runoff collected within the bermed areas around the dock risers, railcar transfer station containment system, lube cells, tank truck loading and offloading racks/stations, equipment washing area, as well as minor quantities which are collected on pump, valve, and flange containment pads within the tank farms where contact with petroleum products is more likely (AMEC 2009).

The primary facilities include:

- Six tank farms storing refined products, black oil, re-refined fuel oil, lube oils, and additives
- Nine transfer facilities including truck loading and unloading racks/stations, rail car loading/unloading station, and marine vessel loading/unloading dock
- Lube oil blending and packaging area
- Office and warehouse buildings
- Hazardous waste storage area
- Maintenance garage
- Stormwater collection and treatment system
- Process water collection and treatment system

2.1.5 Stormwater Drainage System

The stormwater collection and treatment system consists of four separate sub-basins. Tank Farms 1, 2, and 3 each have their own stormwater collection and treatment subsystem with the fourth system consisting of several collection systems that discharge untreated stormwater collected along vehicle drives, parking areas, and riverfront areas to the storm sewers and ultimately to the Willamette River. In some cases, the tank farm systems also collect and treat stormwater from small adjacent areas.

The majority of the stormwater runoff at the Terminal drains to the stormwater collection and treatment system; however, the uncovered transfer facilities, lube oil tank farms, and other higher-risk areas with potential for small leaks and drips (e.g., pump pads) drain to the process water collection and treatment system (which is treated and ultimately discharged under the Site Industrial Waste Discharge (IWD) permit to the sanitary sewer). There is also a significant amount of infiltration through permeable surfaces; surface runoff from a gravel area southwest of Tank Farm 3 which drains to the railroad tracks and then flows overland towards Kittridge Avenue.

The Site stormwater basins ultimately discharge to six separate outfalls into the Willamette River. The primary Site sub-basins and discharge points into the Willamette River are listed below and shown in **Figures 3A through 3D**.

- Tank Farm 3 discharges to the City of Portland Outfall 19 (**Figure 3A**)

- Tank Farms 1 and 2 discharge to the City of Portland Outfall 22 (**Figures 3B and 3C**)
- Dock Area discharges to Outfall WR-012, WR-369, WR-370 and direct discharge to Willamette River (**Figure 3D**)

Tank Farm 3 Drainage Basin

- Runoff collected from within Tank Farm 3 drains to Lift Station 4 where it is automatically pumped to Separator 001 for treatment (illustrated as the green area in **Figure 3A**). Tank Farm 3 discharges through Storm Water Separator 001 (17,300 gallon capacity, controlled by valve) prior to entering a manhole (MH-09) just upstream of MH-11. MH-11 ultimately discharges to City of Portland Outfall 19 (Kittridge Outfall).
- Runoff from the paved area outside the west corner of Tank Farm 3 near Separator 001 is collected by a catch basin near the separator and gravity drains directly to the separator itself.
- Runoff from uncovered areas outside of Tank Farm 3 such as the waste storage area and the rail car loading area are collected and conveyed to Process Separator 003 in Tank Farm 1. These areas are designated as the shaded orange areas of **Figure 3A**.
- All other areas of Tank Farm 3 drainage basin (unshaded areas) sheet flow and ultimately discharge to Portland Outfall 19.

Tank Farm 1 Drainage Basin

- Runoff from Tank Farm 1 flows through Storm Water Separator 002 (7,125 gallons capacity) prior to discharging to MH-12 and ultimately City of Portland Outfall 22. In addition, runoff from the paved areas to the south and just north of the Refined Products Loading Rack is collected in catch basins which drain to Lift Station 2 just to the west of Tank Farm 1. Runoff to the lift station is then automatically pumped to Separator 002 within Tank Farm 1 for treatment. These areas are designated as green shaded areas on **Figure 3B**.
- Stormwater runoff from uncovered areas such as the lube oil truck loading rack, lube cells, and boiler rack are conveyed to Process Separator 003 (see orange areas on **Figure 3B**).
- Areas adjacent to Tank Farm 1 at low risk for leaks/spills such as roof drainage from the warehouse sheet flow towards MH-X which ultimately discharges to Portland Outfall 22.

Tank Farm 2 Drainage Basin

- Runoff from Tank Farm 2 flows through Storm Water Separator 004 (23,060 gallons capacity) prior to discharge to the City of Portland MH-3 (**Figure 3C**). Runoff from Tank

Farm 2 joins runoff from Tank Farm 1 via MH-12 and then ultimately discharges to Portland Outfall 22.

- Runoff from areas with higher risk for leaks/spills within Tank Farm 2 is pumped to Process Separator 003 via Lift Station No. 7 (see orange areas on **Figure 3C**).

Dock Area Drainage Basin

- Areas within the Dock Area discharge untreated stormwater directly to the Willamette River via three different discharges as shown in **Figure 3D**.
- Runoff from the gravel and asphalt concrete parking area discharge directly onto the Willamette River beachhead through an outlet defined as WR-370.
- Runoff from portions of an asphalt concrete parking area and the northern half of the asphalt shed roof discharge directly onto the Willamette River beachhead through an outlet defined as WR-369.
- Runoff from the southern half of the asphalt shed roof and adjacent paved area discharges to WR-012.
- The remaining lightly vegetated beach area does not have any structured drainage system, thus any stormwater from this portion of the Dock Area either infiltrates or sheet flows over the ground surface until it reaches the Willamette River.

The Asphalt Shed does not contain floor drains and significant activities that would contaminate stormwater are not conducted there. A groundwater extraction treatment (GWET) system is located just north of the Asphalt Shed; stormwater or leaks from the GWET system drain to a sump and are treated then discharged to the sanitary sewer under an Industrial Waste Discharge (IWD).

2.1.6 Groundwater

A total of over 40 groundwater monitoring points have been established at the ConocoPhillips Wellbridge Terminals property. The wells show that shallow groundwater is located under the property and elevations of that groundwater vary from an elevation of approximately 30 on the southern portions of the property to 10 feet or less in the northeastern portions of the property, near the Willamette River. Historical information seems to indicate that the storm drain systems have had an impact on the flow of groundwater in the area of the Willbridge Terminals. Some older storm drains have been abandoned and a cutoff wall was installed to minimize the transfer of shallow groundwater through the bedding materials surrounding those pipelines to surface water in the river. The existing storm drains, including the City of Portland Outfall 22, also seem to indicate an impact on shallow groundwater levels. Water levels seem to indicate that the pipelines are impacting the groundwater gradients in vicinity of the storm drains.

The bedding material can act as a conduit for movement of contaminants in the shallow groundwater. In addition, chemicals in the shallow groundwater can also enter the storm drain system through cracks or defects in the pipes when groundwater levels are at or above the pipe zone. Stormwater that contains contaminants can also migrate into groundwater from these damaged pipes during periods of runoff. Integrity of the pipelines in the storm drain system can be an important factor in contaminant transport associated with stormwater and shallow groundwater.

The groundwater gradients on the ConocoPhillips property are less steep in the areas further away from the river but are generally directed toward the river across the property in the area of Tank Farms 1, 2, and 3 (Delta 2010). In the area near the middle and back of the dock area, the groundwater gradient is from southwest to northeast sloping from the Chevron property through the ConocoPhillips property and on toward the river to the east of the ConocoPhillips property. In the area nearer the river, especially in the last 100 feet just above the river, the groundwater gradient is much steeper and seems to indicate a flow more directly to the river.

2.2 OPERATIONS

2.2.1 Historic

Prior to 1908, the land was reportedly undeveloped and information regarding the owners or operations was unavailable. Petroleum-handling operations at the ConocoPhillips Terminal began in 1908 under Unocal. The Terminal received, stored, blended, and distributed a variety of refined petroleum products, including gasoline, diesel fuel, and motor and other lubrication oils throughout its history. The Terminal also produced emulsified asphalt from 1968 to 1975. There is no record of chlorinated solvents having been stored or handled at the site.

2.2.2 Current

The ConocoPhillips Terminal currently manages a variety of petroleum products, including gasoline, diesel, fuel oils and lubrication oils.

Plant operations typically involve the receiving of bulk products to the site by barge, truck, or rail, and storage on the site in the ASTs. Products are then either distributed for shipping directly for retail sale, or are blended to produce refined petroleum products such as lubricant oils and greases. The production process typically consists of transfer by pipeline of bulk products to on-site production plant facilities, where various petroleum products and chemicals are blended to produce the final product. The final product is then packaged for retail distribution.

Oil recovered from the Terminal oil/water separators, tank cleaning operations, and other operational and maintenance related activities is either stored temporarily in on-site tankage or shipped off-site for recycling or disposal. Recovered oils, also known as slop oils, primarily consist of oils skimmed from the process separator or recovered from tank cleaning and other maintenance activities. Slop oil stored on-site is either blended into marine or industrial fuel oils stored at the Terminal in allowable proportions or sold to an outside vendor for fuel blending. Sludges/tank bottoms are drummed or removed by vacuum truck and transported to an approved recycling or disposal facility. The oil/water separator systems at the site have been in place since 1930.

Waste from the site includes inline filters, tank bottom sludges, treated process water, slop oils, and separator sediment. In line filters are drained and deposited in a dumpster for off-site disposal. If the filters are hazardous, they are disposed of at the Chem-Waste facility in Arlington, Oregon. Stormwater runoff is discussed in more detail in Section 2.1.5. In general, stormwater flows through three gravity flow oil/water separators (#001, #002, #004). Recovered oils from Separators #001, #002, #003, and #004 are skimmed off and sent to Tank 36 for fuel oil blending or sale to an outside vendor. Process water is directed to Separator 003 and effluent from the gravity fed oil/water separator is pumped through a hydrocleaner for further treatment. The hydrocleaner effluent discharges to the City of Portland wastewater treatment plant. Slop oil that meets flash and specific gravity specifications is sold to an outside vendor for use in intermediate products or blended into marine or industrial fuel oils handled at the facility. All recovered product goes to Tank 36.Identification of Potential Upland Contaminant Sources

The Site stores various grades of gasoline, distillate, fuel oils, black oils, lube oils, and various lube oil and refined product additives (including ethanol and biodiesel) for distribution and sale. A detailed list of the materials stored on site is included in the SPCC Plan. Insignificant quantities of hazardous wastes are also stored at the Site and consist of primarily oily rags and sorbents, used oil, used antifreeze, spent non-halogenated solvents (e.g., hexane and methanol), and miscellaneous other wastes generated through normal maintenance operations. Drums and containers of wastes are stored in the waste storage area to the west of Tank Farm 3. This area is located on a concrete slab that drains to a central catch basin and then to the process water system. The area is covered, fenced, and locked.

Potential pollutant sources are primarily petroleum products, including lighter hydrocarbon components of gasoline, diesel, and lube oils such as benzene, toluene, ethylbenzene, and total xylenes (BTEX) as well as total petroleum hydrocarbons (TPH).

2.3 IDENTIFICATION OF CONTAMINANTS OF INTEREST

The primary potential pollutants that could potentially be present in stormwater discharges at the facility are petroleum products. The monitoring parameter “total oil and grease” may be considered the primary potential parameter in stormwater discharges. More specifically, the constituents of concern would be the lighter hydrocarbon components of gasoline, diesel, and lube oils that are generally the most soluble. These would BTEX as well as TPH. Ethanol is also very soluble in water as are selected components of other additives. Petroleum products could contact stormwater from spills during storage or transfer operations or from the occasional drip of crankcase or lube oils from the tank trucks or vehicles passing through the Terminal (AMEC 2009).

KHM Environmental Management, Inc. (KHM) conducted a Remedial Investigation (RI) and presented the findings in the *Final Upland Remedial Investigation Report* dated August 1, 2003. RI field activities included subsurface soil sampling, sediment sampling, groundwater monitoring well network installation and free product removal activities. The RI identified petroleum hydrocarbon compound COIs and metals associated with bulk fuel storage.

Potential COIs identified include the following:

Table 2. List of Potential Chemicals of Interest	
Metals	Arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc
PAHs	Polynuclear aromatic hydrocarbon compounds related to diesel/heavy oil product releases
VOCs	Aromatic volatile organics (e.g. BTEX) related to gasoline product releases

In addition to the COIs described previously, the DEQ has determined that analytical parameters for stormwater investigations conducted at all upland sites should include PCB Arochlors and phthalates.

2.4 BEST MANAGEMENT PRACTICES

2.4.1 Stormwater Pollution Control Plan

A Stormwater Pollution Control Plan (SWPCP) has been prepared to comply with the NPDES 1200-Z General Permit. The current SWPCP was prepared by AMEC Earth & Environmental, Inc. and is dated August 17, 2009.

2.4.2 Best Management Practices

Stormwater Best Management Practices (BMPs) are site controls that minimize the exposure of pollutants to stormwater or remove pollutants from stormwater before discharge to surface waters.

The stormwater collection and treatment system at the Terminal consists of a network of catch basins, lift stations, underground piping, valves, and separators designed to collect and treat stormwater. Treated stormwater is discharged to the municipal storm drain system and the Willamette River under the Terminal's NPDES stormwater discharge permit. Most of the system operates under gravity flow although there are lift stations, where required, for transferring stormwater to the oil/water separators.

The stormwater catch basins are located throughout the Terminal, and are intended to collect stormwater from those areas where the potential for contact with oil or other contaminants is minimal. The majority of these catch basins are connected to the stormwater collection system that routes the water to one of three oil/water separators for treatment. In areas where the potential for spills is minimal or non-existent, such as vehicle drives and parking areas, the stormwater is routed directly to the municipal storm drain system. **Figures 3A through 3D** show major elements of the stormwater management system including drainage basins, catch basins, oil/water separators, outfalls, and subsurface piping.

ConocoPhillips regularly inspects and maintains all pertinent equipment to reduce the likelihood of a spill getting into the stormwater system. The stormwater and process water systems are inspected daily to ensure effective operation. Any accumulations of oil in the oil/water separators are recovered and recycled.

In addition, the Terminal operators perform at least two visual inspections of the tank farm per day and a monthly inspection of the entire Terminal including tanks, containment systems, pipelines, and process and stormwater collection systems. Any problems or potential problems are noted and rectified.

BMPs implemented at the site are described below.

2.4.2.1 Exposure Prevention

Mitigation methods noted in the SWPCP include immediately cleaning up spills, covering the majority of transfer stations, employing secondary containment berms around pumps and the majority of valves and flanges, draining transfer stations to the plant process system (Separator 003 which discharges to sanitary sewer) with the exception of infrequently used Lube Oil and Gasoline tanks. Color coding of Site drainage systems enables facility personnel to more quickly identify the ultimate destination of liquids entering the drains and to take the appropriate actions to prevent contamination. Terminal personnel are trained to use a post indicator valve to block drainage from leaving the Site storm drain system if needed (AMEC 2009).

2.4.2.2 Site Stormwater System BMPs

Mitigation methods noted in the SWPCP include oil/water separators, inverted tees in catch basins, oil sorption pads in catch basins, catch basins with grates and screens, sedimentation separation chambers, stormwater diversion, covering ground surfaces with pavement or gravel, and routine catch basin, piping, and separator cleaning and maintenance (AMEC 2009). The catch basins on site are inspected and maintained on a biannual basis.

2.4.2.3 Stormwater Treatment

The stormwater collection and treatment system consists of four separate sub-basins, with three of the four sub-basins containing partial stormwater treatment. Tank Farms 1, 2, and 3 each have their own stormwater collection and treatment subsystem. The separators, including the final box prior to discharge, are open at the top to allow visual additional monitoring. The separator discharge valves are generally kept closed except during storm events as a measure to minimize potential for large accidental spills from discharge off-site through the stormwater separators. These valves will also close in the event of a power failure. The condition of the water in the final boxes of the separators is visually monitored; any evidence of oil or other contamination is removed prior to discharge (AMEC 2009).

2.4.2.4 Stormwater Bypass

Stormwater runoff from the Upper and Lower Lube Cells and the F-Tank Farm is routed to the process water system. Stormwater runoff is then treated, and eventually discharged to the sanitary sewer (AMEC 2009).

2.4.2.5 Employee Education and Training

Terminal employees are given detailed instructions in the maintenance and operation of all facilities which they are expected to operate. New employees work with other personnel until they are deemed qualified by their supervisor to work alone (AMEC 2009). An annual employee training is completed. The information covered and the employees in attendance are documented.

2.4.2.6 Housekeeping

Outdoor areas of the facility are kept clean and orderly. All spills and leaks are cleaned up immediately or as soon as practical. Activities such as vehicle and equipment maintenance and washing are conducted in contained areas (AMEC 2009). The “Monthly Stormwater system Inspection Form” is used for the monthly inspections. The form includes inspection of bulk storage containers, facility containment, drainage, and water treatment, transfer operations, pumping, and process water, tank car, tank truck loading/unloading rack, etc. The form is dated and signed by the inspector.

2.4.2.7 Erosion Control

All dike walls used for spill containment are made of cast-in-place concrete, concrete block, concrete, or asphalt curbing, or asphalt covered earthen berms. To control traffic related erosion, the Terminal access ways and parking are paved with asphalt. All operation areas of the Terminal are covered with gravel, paved with asphalt, and/or contained by a curb to prevent sediment accumulation and erosion. The exception is the unused strip of land behind the Asphalt Shed (warehouse) near the dock. In this area, sandy sediments extend from the water's edge up the slope to the asphalt shed and the adjacent parking area and vacant lot. Erosion from this slope is minimized by moving stormwater off the slope through pipes to lower elevations near the beach where discharge is to catchments filled with gravel and cobbles to allow infiltration (AMEC 2009).

2.4.3 Stormwater Source Control Measures Implemented during Source Control Evaluation

2.4.3.1 Catch Basin Cleanouts

There are 64 catch basins on the site which are divided and grouped together based on drainage area and location into 8 sub-groups as listed in the table below.

Catch Basin Sub-Groups							
WC-SED-1	WC-SED-2	WC-SED-3	WC-SED-4	WC-SED-5	WC-SED-6	WC-SED-7	WC-SED-8
CB-18	CB-27	CB-29	CB-A	CB-42	CB-05	CB-11	CB-01
CB-20	CB-28	CB-35	CB-B	CB-43	CB-06	CB-14	CB-02
CB-21	CB-31	CB-36	CB-C	CB-44	CB-07	CB-16	CB-03
CB-22	CB-31	CB-37	CB-D	CB-46	CB-08	CB-155	CB-04
CB-23	CB-33	CB-39	SEP-001	CB-47	CB-09	CB-156	CB-12
CB-24	LS-4	CB-40	SEP-002	CB-48	CB-10	MH-4	CB-13
CB-25	MH-9S	CB-41	SEP-004	CB-49	LS-5	MH-9N	CB-17
CB-26	MH-11	CB-112	MH-3N	CB-50	MH-5	MH-12	CB-45

Based on interviews with the Terminal Supervisor and Terminal employees, the catch basins were not cleaned or sampled during 2009. However, Separator 2 was cleaned in March 2009; Separators 001 and 004 were cleaned in August 2009. All wastes generated during this event were disposed of at Oil Re-Refining Company (ORRCO) in Portland, Oregon.

2.4.3.2 Storm Line Cleanouts

On July 19, 2010, Stantec Consulting was onsite to provide environmental oversight for the repair of the 12-inch-diameter pipe in Manhole 12 (MH-12). Stantec hired Stratus Corporation and ProPipe to perform this work. Prior to beginning, a facility orientation was conducted and the necessary Job Safety Analysis (JSA) and confined space entry permit were completed.

On October 1, 2008, the inside walls of MH-12 were lined with a silica resin provided by RS Lining Systems. Stratus Corporation applied the resin with oversight from SECOR Environmental (now Stantec). This work was performed to prevent groundwater from seeping into the stormwater.

The repair was performed in order to correct and prevent any leaks which would allow groundwater to seep into the pipe.

A remote controlled device equipped with a video camera was used to conduct a real-time inspection of the pipe. The video documentation showed signs of deterioration in the liner at 101.5 inches (in.) upstream of the opening in the manhole. There was a weep hole along the upper part of the pipe, which was allowing an oily substance to leak in the pipe. The pipe was prepped using a hydro-jet to clean the area to be repaired, as well as feed a polypropylene line through the nearest cleanout; the line would later be used to pull the liner applicator back through the pipe. An employee from ProPipe then entered the manhole to verify the location of the weep. The remote controlled camera and a tape measure were us to determine the length of the liner and how far it would be inserted. The liner was prepared by applying a resin substance onto a fiberglass cloth which was wrapped around an air bag. The fiberglass cloth was secured with bailing wire to prevent it from sliding off during insertion. Once the air bag was inserted to the desired location, the bag was filled with compressed air and secured in place so that the new liner could cure. Cure time was roughly 2.5-3.0 hours. Once the liner had cured the bag was deflated and removed. A video inspection of the repair was performed. The installation was considered a success based on the video inspection. All water used during this repair was collected using a liquid vac-truck; the waste water was placed into on onsite oil/water separator. No samples were collected during this event.

The weep point can be seen on both videos. However, the “after” video shows where the new liner had successfully covered and sealed the weep. The plastic hanging from the top of the pipe is from plastic sheeting which covered the airbag to prevent the liner from sticking to it. The hanging plastic should not impede flow and was not removed for fear of separating the old and new liners.

2.4.3.3 Separators

ConocoPhillips’ policy is to inspect the Portland Terminal’s stormwater and wastewater (referred to herein as process water) system and annually review the contents of the combined Storm Water Pollution Control Plan (SWPCP) as required by NPDES Permit Number 1200-Z and City of Portland IWD Permit number 400.181 (AMEC 2009). Review of the most recent SWPCP for the Site shows records of reviews and changes made to the SWPCP at least annually since 2002.

2.4.4 Spill Prevention and Response Procedures

The petroleum product storage and transfer facilities at the ConocoPhillips Terminal are equipped with a variety of spill prevention and containment devices. BMPs are followed to isolate potential sources of contamination from the stormwater system. Transfers of products are conducted in areas that are segregated from stormwater drainage areas by walls, curbs, or other means of containment. Management procedures stress safe transfer operations, maintenance of safety and containment systems, and rapid, accurate communications between operating personnel during transfers or in responding to a spill (AMEC 2009).

Whenever products are being transferred, facility personnel have access to internal alarms or emergency communication devices. Employees do not work on the premises alone unless they have immediate access to a cellular telephone or a handheld two-way radio, or are otherwise capable or summoning assistance in the event of a spill or other emergency (AMEC 2009).

Additional spill prevention strategies implemented at the Site include preventative maintenance, regular inspections and repairs, and good housekeeping practices.

2.4.5 System Operation and Maintenance Records

The ConocoPhillips Terminal maintains records of the time, date, and details of the implementation of the SWPCP. This information is maintained at the ConocoPhillips Portland Terminal Office. Schedule A.3.d of the 1200-Z Permit indicates that the permit registrant must record and maintain, at the facility, inspection, maintenance, repair, education, and spill history information.

Whenever there are leaks, spills, or other instances at the facility which contaminates stormwater, a description of the occurrence is documented. All records regarding stormwater contamination are maintained at the Site for a minimum of three years. The annual inspection and certification of the effectiveness of the SWPCP are kept on record for at least three years, as well. Incidents involving product spills or leaks, which impacted or may have impacted stormwater runoff, are documented in addition to a description of the corrective actions taken.

ConocoPhillips maintains a record of training classes attended by their employees. This training documentation is kept on record at the Terminal office for a minimum of three years.

2.5 CONTAMINANT MIGRATION PATHWAYS

The DEQ and EPA have identified pathways by which the Willamette River and associated aquatic sediments have been impacted by upland constituents of interest (COIs). Each of the pathways is listed below.

2.5.1 Direct Discharge Pathway

Pollutants from commercial, industrial, private, or municipal outfalls may be directly discharged to the Portland Harbor Superfund Site, including permitted discharges such as industrial wastes, stormwater runoff, and combined sewer overflows. Other than stormwater, there is not a complete path for direct discharge at the Site. Contaminants may enter the Portland Harbor Superfund Site by being carried to the Willamette River by water that runs off a site into storm drains after it rains, delivered to the river by stormwater pipes. Under a NPDES permit, stormwater is discharged from the site and flows to one of five outfalls that discharge into the Portland Harbor. Therefore, the stormwater pathway is complete and is evaluated in this report.

2.5.2 Groundwater Pathway

Contaminated groundwater may enter the Portland Harbor Superfund Site directly via discharge through sediments, bank seeps, or infiltration into storm drain pipes, ditches or creeks that discharge to the Willamette River. The only potentially complete groundwater pathway at the Site is groundwater infiltration into stormwater conveyance lines that flow to one of two outfalls and discharge into the Portland Harbor, or through preferential pathways along utility corridors along NW Front Street. These groundwater pathways are complete and are evaluated as part of this report.

2.5.3 Overland Transport Sheet Flow Pathway

The uncontrolled flow of water from a site to the river and the transport of other materials from a site may deliver contaminants to the Willamette River. The only area for the overland transport pathway is the dock area and the DEQ Milestone Report notes that this is an insignificant pathway and no actions are recommended.

2.5.4 Erosion Pathway

River bank soil, contaminated fill, waste piles, landfills, and surface impoundments may release contaminants directly to the Portland Harbor Superfund Site through erosion via soil, erosion into stormwater, or by leaching to groundwater. The only area of the site that is adjacent to the Willamette River is the dock area and the DEQ Milestone Report notes that this is an insignificant pathway and no actions are recommended. The only complete erosion pathway at the site is erosion of site soils into stormwater, which is evaluated as part of the stormwater pathway in this report.

2.5.5 Overwater Activities Pathway

Contaminants from overwater activities at riverside docks, wharves, or piers; discharges from vessels; fuel releases; and spills may impact the Portland Harbor Superfund Site. The only area of the site where there are overwater activities is the dock area and there are no known sources of contaminants, so this pathway does not need to be investigated.

2.5.6 DEQ Milestone Report Pathways

Per Table 1 of the DEQ Milestone Report dated January 5, 2010, the following priorities are noted for the Willbridge Terminal:

- Overland transport and sheet flow. The SCE is complete and noted as an insignificant pathway with no actions recommended.
- Bank erosion. This is noted as an insignificant pathway with no actions recommended.
- Groundwater. Deep groundwater is noted as a high priority and a SCE is being completed for the entire Willbridge Terminal. Therefore, deep groundwater is not addressed in this report.
- Stormwater (Direct Discharge). The stormwater pathway priority is awaiting completion of the SCE.
- Overwater activities. This pathway is noted as not applicable because there are no known current sources.
- Other. No other pathways are identified.

Therefore, this SCE Report addresses the stormwater and shallow groundwater pathways.

3.0 Regulatory History

3.1 DESCRIPTION

The regulatory history of the site includes ASTs and USTs, hazardous wastes, stormwater quality, and air quality.

3.1.1 Regulated Tanks

3.1.1.1 Above Ground

The facility has 117 ASTs. Tanks are of welded and riveted steel construction and contain different grades of gasoline, #2 diesel, #1 diesel, black oil, lube oil, and lube blend/base stocks, RFO, additives, ethanol, slops, and transmix. The total capacity of the tanks is approximately 731,500 barrels (30,723,000 gallons) with the capacity of the largest tank being 80,269 barrels (3,371,298 gallons). A list of the tanks and their contents is presented in the Terminal's SPCC Plan.

3.1.1.2 Underground Storage Tanks

The facility currently has two regulated underground storage tanks which store slop oils and flush oils. The tanks are located beneath the materials testing laboratory. The tanks were installed in December 1981 and the regulatory certificate number is 26-1203-2010-OPER and the permit numbers are ADFJB and ADFJC.

3.1.2 Hazardous Waste Management

The Hazardous Waste Storage Area is located north of the boiler room and outside the southwest corner of Tank Farm 3 as shown in **Figure 2**. The storage facility is primarily used to store drums or totes of hazardous, as well as non-hazardous, wastes prior to shipment to an approved disposal facility. Occasionally, the Hazardous Waste Storage Area is also used to store totes of additives, lube oil samples, or other products since the area is contained and equipped with a drain into the process water system.

The facility is currently considered a large quantity generator of hazardous waste, EPA ID ORD087458196.

3.1.3 Stormwater Permit

Currently, the facility has an NPDES General Permit for Industrial Stormwater Discharges, GEN12Z, Permit No. 23134. The permit was effective as of December 7, 2007 and has a renewal date of June 30, 2012. The facility is in full compliance with the NPDES Permit.

3.1.4 Air Quality Permit

Currently, the site has a Standard Air Contaminant Discharge Permit issued by Oregon DEQ (Primary SIC Code 5171 Petroleum Bulk Terminals, Air Quality Permit #26-2026-ST-01). The permit was originally issued on October 9, 2008 and has a renewal date of April 1, 2013. The operational status of the permit is active and the facility has been in compliance

3.2 VIOLATIONS

There is one violation on file with the DEQ. The violation was issued on November 30, 2007 by the DEQ Western Region Water Quality Division (Enforcement Number 2007-138). A Notice of Civil Penalty Assessment was imposed on ConocoPhillips for violating a technology based effluent limitation.

Based on interviews with the Terminal Supervisor, no files relating to violations or incidents were on present on-Site. Files are required to be kept on Site for five years.

3.3 POLLUTION COMPLAINTS AND SPILLS

Spill data for ConocoPhillips terminal dates back to January 1979. Documented spills number 38 at the ConocoPhillips terminal. Reported spills range in volume from 11,700 gallons to one gallon. The volume of known spills totals approximately 35,421 gallons. Documented spills are summarized in **Table 3** and shown on **Figure 2**.

Two releases from storage tanks are on record with the DEQ. The first was reported in 1994 during the decommissioning of a non-regulated heating oil tank (DEQ Log Number 26-94-6015). The second was reported in 1997 during the decommissioning of a diesel tank (DEQ Log Number 26-97-0577).

3.4 CLEANUP STATUS

3.4.1 Material Left in Place

Based on interviews with Terminal Supervisor, no contaminated materials were left in place during cleanup activities.

4.0 Source Control Evaluation

4.1 SUMMARY OF DATA

This section summarizes the data collected during the source control evaluation and evaluated the frequency and magnitude of the results compared to the JSCS screening level values (SLVs).

4.1.1 Catch Basin Sediment

Delta Consultants (Delta) completed catch basin sediment sampling for the Site September 24 through 26, 2007 and submitted a report to DEQ in January 2008. Sediment samples were collected from 12 catch basins (CB-01, CB-10, CB-16, CB-17, CB-18, CB-23, CB-32, CB-35, CB-42, CB-B, and CB-C) as shown on **Figures 3A through 3D**. Five grab samples were collected from each catch basin (one from each quadrant and one from the middle), thoroughly mixed, and sampled for one representative composite sample from each catch basin.

The catch basins are located in the following storm drainage areas:

- Tank Farm #3 discharging to Portland Outfall 19 (see **Figure 3A**):
  - CB-42 (flows to MH-11)
  - CB-32 (flows to SEP-001)
  - CB-35 (flows to SEP-001)
- Tank Farm #1 discharging to Portland Outfall 22 (see **Figure 3B**):
  - CB-1 (flows to SEP-002)
  - CB-17 (flows to MH-12)
  - CB-48 (flows to MH-X)
  - CB-10 (flows to SEP-002)
  - CB-16 (flows to SEP-002)
- Tank Farm #2 discharging to Portland Outfall 22 (see **Figure 3C**):
  - CB-18 (flows to SEP-004)
  - CB-23 (flows to SEP-004)

- Dock Area (see **Figure 3D**):
    - CB-B (flows to WR-369)
    - CB-C (flows to WR-370)

The sample results are included in **Appendix A** and further discussed in Section 4.2.

In addition to the 2007 catch basin sediment sampling, catch basin sediment data was also collected on August 13, 2010 at three locations as shown on **Figures 3A through 3D**. Samples were collected from 12 of the 64 catch basins on site and are representative of three drainage areas that discharge to the Willamette River without treatment/containment. The catch basins were divided into three groups based on the drainage basin where they are located. Samples were collected from the middle of the sediment column and placed into a laboratory provided sample container specific to each catch basin. The samples there then combined with the other samples from the drainage basin and thoroughly mixed. The composite samples were analyzed and the complete analytical results are included in **Appendix A**. The three drainage areas sampled include:

- Area 4 includes a composite of the four catch basins in the Dock Area, CB-A, CB-B, CB-C, and CB-D (sample (WC-SED-4)).
- Area 5 includes a composite of CB-42 through CB-50 in the vicinity of the warehouse discharging to MH-X (sample (WC-SED-5)).
- Area 8 is a sample of CB-17 in the vicinity of the truck dock discharging to MH-12 (sample (WC-SED-8)).

4.1.2 Groundwater

The deep groundwater pathway is being evaluated separately from this report, but the shallow groundwater pathway is included in this report. The complete pathway is for shallow groundwater infiltration into the stormwater conveyance system. Ongoing quarterly groundwater monitoring is being completed by Delta Consultants on behalf of the WTG. The quarterly monitoring data was reviewed to estimate the depth to groundwater. In the majority of the wells the depth to groundwater is 15 to 20 feet; however, the depth to groundwater is as shallow as 3 feet in some of the wells. In the wells where groundwater was found at a depth of less than 15 feet, no measureable product was found. It is possible that the shallow groundwater could migrate into the storm drainage pipes to complete the pathway. Therefore, the shallow groundwater pathway is included in the stormwater pathway discussion.

Water quality samples taken from storm drains show some level of impact at numerous locations on the property. But the property does not appear to be uniformly impacted to a high degree. Some chemicals appear to be located in most areas that have been sampled on the property. As an example, in addition to the TPH and VOC compounds being identified at many locations on the site; metals including, arsenic, copper, and lead, are found at or near screening levels in a great many of the samples collected. However, water quality data is not consistent at each sampling point and does not appear to correlate closely with seasonal change and/or groundwater elevation changes.

Manganese exceeds the screening level in only one storm drain, but is identified in many of the wells. Additionally, water quality data collected from Separator 001 and an adjacent area of Tank Farm 3 served by Catch Basin 42 show levels above the SLV. Stormwater data from the other areas of the site have had some low levels of cadmium reported but not exceeding the SLVs. Yet at the same time, many of the groundwater samples collected have shown elevated cadmium levels.

4.1.3 Stormwater

As noted in the storm drainage section above, the site has four discharge locations in addition to the Dock Area. The stormwater sampling locations are identified by watershed area below and shown in **Figures 3A through 3D**.

Dock Area. This data has been collected at the following three locations: WR-369, WR-370, WR-012 (metals only because it's roof runoff).

Tank Farm 1. Tank Farm 1 discharges to MH-X and MH-12 along NW Doane Street. MH-X collects runoff from warehouse area west of Tank Farm 1. MH-12 collects runoff from Tank Farms 1 and 2 and has three pipes that enter into it, a 4" from CB-17 in the asphalt area, a 12" from Separator 002, and a 6" from the truck scale area. Each of these storm drain pipes were sampled.

Tank Farm 2. Tank Farm 2 discharges to MH-3 along NW Doane Street. MH 3 only receives water from Separator 004. Samples from Separator 004 were taken when the stormwater was discharged and therefore was not sampled during the actual storm event.

Tank Farm 3. Tank Farm 3 discharges to MH-9 along the Burlington Northern Railroad. There are physical/access restrictions to sampling directly on MH-9, which is located on Burlington Northern Railroad property. MH-11 (down gradient from MH-9) has been paved over and is no longer accessible. MH-9 receives runoff from two general locations, Separator 001 and the Lube Cell. Two upgradient sample locations were used to provide a representative sample for runoff from this area. The first sample location is Separator 001 and the second location is CB-42. In addition, historical groundwater and soil analytical results in the area were reviewed to determine if inflow to the storm drainage system could potentially be a concern.

The above sampling locations were sampled during four storm events as described below. A qualifying storm event required: 1) antecedent dry period of at least 24 hours during which less than 0.1 inch of precipitation fell at the site; 2) minimum predicted rainfall depth of 0.2 inches;

and 3) expected storm duration of at least three hours. Qualifying rain events were predicted using National Weather Service and National Oceanic and Atmospheric Administration websites. Rainfall totals were determined through the use of the United States Geological Service maintained Yeon Avenue Rain Gauge located approximately one mile from the Site. Detailed precipitation data is included in **Appendix B**.

Table 4. Storm Data

Date	Total Rain (inches)	Storm Duration (hr)	Locations Sampled
October 31, 2008	0.22	7	WR-368, WR-370, WR-012
March 16, 2009	0.23	7	WR-368, WR-370, WR-012
April 28, 2009	0.28	6	WR-368, WR-370, WR-012
May 12, 2009	0.42	7	WR-368, WR-370, WR-012
March 25, 2010	0.36	4	MH-X, MH-12, MH-3, SEP-001, CB-42
April 8, 2010	0.26	10	MH-X, MH-12, MH-3, SEP-001, CB-42
April 27, 2010	1.06	12	MH-X, MH-12, MH-3, SEP-001, CB-42
May 26, 2010	0.28	8	MH-X, MH-12, MH-3, SEP-001, CB-42

The storm precipitation data is included in **Appendix B** and a brief narrative of each of the events is included below.

October 31, 2008. The October 31, 2008 storm event produced 0.22 inches of precipitation in 7 hours (from 4:00 am to 11:00 am) and was preceded by 24 hours of dry conditions. Manhole and outfall samples were taken between 9:30 am and 12:05 pm.

March 16, 2009. The March 16, 2009 storm event produced 0.23 inches of precipitation in 7 hours (from 7:00 am to 2:00 pm) and was preceded by a storm event totaling 0.57 inches on March 15. Manhole and outfall samples were taken at 11 am.

April 28, 2009. The April 28, 2009 storm event produced 0.28 inches of rain in 6 hours (from 3:00 am to 10:00 am) and was preceded by 0.21 inches of rain on April 27. Manhole and outfall samples were taken between 11:05 am and 1:20 pm.

May 12, 2009. The May 12, 2009 storm event produced 0.42 inches of precipitation in seven hours (from 12:00 pm to 7:00 pm) and was preceded by 24 hours of dry conditions.

March 25, 2010. The March 25, 2010 storm event produced 0.36 inches of precipitation in six hours (11:00 pm on March 24 through 4:00 am on March 25) and was preceded by 24 hours of dry conditions. Manhole and catch basin samples were taken at 8:00 am. SEP-001 samples were taken when the separator was discharged to the storm drain system.

April 8, 2010. The April 8, 2010 storm event produced 0.26 inches of precipitation in 10 hours (from 8:00 pm through 6:00 am) and was preceded by 24 hours of dry conditions. Manhole and catch basin samples were taken at 6:00 am. SEP-001 samples were taken when the separator was discharged to the storm drain system.

April 27, 2010. The April 27, 2010 storm event produced 1.06 inches of precipitation in 12 hours (from 2:00 pm on April 26 through 6:00 am on April 27). Manhole and catch basin samples were taken at 6:00 am on April 27. SEP-001 samples were collected when the separator was discharged to the storm drain system.

May 26, 2010. The May 26, 2010 storm event produced 0.37 inches of precipitation in 24 hours (from 4:00 am on May 25 through 11:00 am on May 26) and was preceded by 24 hours of dry conditions. Manhole and catch basin samples were collected on 11:00 am on May 26 and SEP-001 samples were taken when the separator was discharged to the storm drain system.

The complete analytical results are included in **Appendix B**.

The additional data reviewed for Tank Farm 3 includes historical groundwater and soil analytical results in the area of CB-42 and CB-43 from the Final Upland Remedial Investigation Report (HKM 2003). Groundwater and/or soil samples were collected for analysis from borings that were installed during the October/November 1998 remedial investigations. Summary of results as related to the SLVs is in the below table.

Table 5. Summary of Historic Data in the Vicinity of CB-42		
Sample Depth	**BTEX**	**PAH**
Groundwater	NA	NA
Surface Soil (within 6" bgs)	NS	Exceeded*
Vadose Zone (3.5' bgs)	ND	ND
Capillary Fringe (12' bgs)	ND	ND
Saturated Zone (28' bgs)	ND	ND

*Exceeded the JSCS Screening Level Value for Indeno (1,2,3-cd) pyrene
ND: Not detected
bgs: Below Ground Surface

4.2 STORMWATER PATHWAY

This section summarizes the sediment and stormwater data collected to evaluate the stormwater pathway. The results are discussed by chemical of interest for both sediment and stormwater data. Each potential pollutant was also screened against the JSCS sediment and stormwater SLV from Table 3-1 of the JSCS (EPA/DEQ 2005).

4.2.1 Metals

4.2.1.1 Catch Basin Sediment Results

Catch basin sediment results were obtained for Tank Farm 3 discharging to Outfall 19, Tank Farm 1 and Tank Farm 2 discharging to Outfall 22, and the Dock area which discharges to the Willamette River. The following constituents were detected above the SLVs:

- Arsenic (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Cadmium (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Chromium (Tank Farm 1 and Tank Farm 2)
- Copper (Tank Farm 1, Tank Farm 2, Tank Farm 3)
- Lead (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)

- Mercury (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Nickel (Tank Farm 1, Tank Farm 2, and Tank Farm 3)
- Zinc (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)

4.2.1.2 Stormwater Results

Stormwater results were collected for discharges to Outfall 19 (Tank Farm 3), Outfall 22 (Tank Farm 1 and Tank Farm 2), and the Dock area which direct discharges to the Willamette River. The following constituents were detected above the SLVs:

- Arsenic (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Cadmium (Tank Farm 3 and Dock Area)
- Copper (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Lead (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)
- Manganese (Tank Farm 1 and Dock Area)
- Silver (Tank Farm 1)
- Zinc (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)

4.2.2 Polychlorinated Biphenyls

4.2.2.1 Catch Basin Sediment Results

Catch basin sediment results collected for the site did not detect PCBs above the MDL for any of the sampling locations. The MDLs were at least half of the SLVs.

4.2.2.2 Stormwater Results

Stormwater results collected for the site did not detect PCBs above the MDL for any of the sampling locations. The MDLs were at least half of the SLVs.

4.2.3 Volatile Organic Compounds

4.2.3.1 Catch Basin Sediment Results

Catch basin sediment results collected for the site occasionally detected VOCs for toluene, ethylbenzene, xylenes, naphthalene, isopropyl-benzene, n-Propyl-benzene, and 1,3,5-Trimethyl-benzene. However, there are no SLVs for these constituents.

4.2.3.2 Stormwater Results

Stormwater results collected for the site did not detect VOCs above the MDL for any other the sampling locations. However, the following constituent MDLs were greater than the SLVs:

- 1,2,3- Trichloropropane (MDL = 0.37 ug/L and SLV = 0.0095 ug/L)
- Cis-1,3-Dichloropropene (MDL = 0.086 ug/L and SLV = 0.055 ug/L)
- Trans-1,2-Dichloropropene (MDL = 0.16 ug/L and SLV = 0.055 ug/L)
- Trichloroethene (MDL = 0.22 ug/L and SLV = 0.17 ug/L)

4.2.4 Polycyclic Aromatic Hydrocarbons

4.2.4.1 Catch Basin Sediment Results

Catch basin sediment results were obtained for Tank Farm 3 discharging to Outfall 19, Tank Farm 1 and Tank Farm 2 discharging to Outfall 22, and the Dock area discharging to the Willamette River. The following constituents were detected above the SLVs:

- Acenaphthene (Dock Area)
- Benzo (a) anthracene (Tank Farm 1)
- Benzo (a) pyrene (Tank Farm 1)
- Benzo (g,h.i) perylene (Tank Farm 1 and Tank Farm 2)
- Chrysene (Tank Farm 1)
- Fluoranthene (Tank Farm 1)
- Fluorene (Dock Area)
- Indeno(1,2,3-cd)pyrene (Tank Farm 1 and Tank Farm 2)
- Phenanthrene (Tank Farm 1 and Dock Area)
- Pyrene (Tank Farm 1 and Dock Area)
- 2-Methylnaphthalene (Dock Area)

4.2.4.2 Stormwater Results

Stormwater results were collected for discharges to Outfall 19 (Tank Farm 3), Outfall 22 (Tank Farm 1 and Tank Farm 2), and the Dock area which directly discharges to the Willamette River. The following constituents were detected above the SLVs:

- Naphthalene (Tank Farm 3)
- Chrysene (Tank Farm 1 and Dock Area)
- Benzo(b)fluoranthene (Tank Farm 1, Tank Farm 2, Tank Farm 3)

In addition, the stormwater analysis for the constituent listed below was not detected; however, the MDL was greater than the SLV:

- Benzo(a)anthracene (MDL = 0.020 ug/L for one of the storm events, 0.0017 ug/L for three of the storm events and SLV = 0.018 ug/L)

4.2.5 Phthalate Esters

4.2.5.1 Catch Basin Sediment Results

Catch basin sediment results were obtained for Tank Farm 3 discharging to Outfall 19, Tank Farm 1 and Tank Farm 2 discharging to Outfall 22, and the Dock area discharging to the Willamette River. The following constituents were detected above the SLVs.

- Di-n-butylphthalate (Tank Farm 1)
- Bis(2-ethylhexyl)phthalate (Tank Farm 1, Tank Farm 2, Tank Farm 3, and Dock Area)

4.2.5.2 Stormwater Results

Stormwater results were collected for discharges to Outfall 19 (Tank Farm 3), Outfall 22 (Tank Farm 1 and Tank Farm 2), and the Dock area which direct discharges to the Willamette River. The following constituents were detected above the SLVs:

- Butylbenzyl phthalate (Tank Farm 3)

4.2.6 Organochlorine Pesticides

4.2.6.1 Catch Basin Sediment Results

Catch basin sediment results were obtained for Tank Farm 3 discharging to Outfall 19, Tank Farm 1 and Tank Farm 2 discharging to Outfall 22, and the Dock area discharging to the Willamette River. The following constituents were detected above the SLVs.

- Gamma-BHC (Lindane) (Tank Farm 2)

4.2.6.2 Stormwater Results

Stormwater results collected for the site did not detect VOCs above the MDL for any other sampling locations. However, the following constituent MDLs were greater than the SLVs:

- α-BHC (MDL = 0.0209 ug/L and SLV = 0.0049 ug/L)
- β-BHC (MDL = 0.0188 ug/L and SLV = 0.017 ug/L)
- Heptachlor (MDL = 0.0188 ug/L and SLV = 0.000079 ug/L)
- Heptachlor epoxide (MDL = 0.0134 ug/L and SLV = 0.000039 ug/L)
- Aldrin (MDL = 0.0198 ug/L and SLV = 0.00005 ug/L)
- Chlordane (MDL = 0.0179 ug/L and SLV = 0.00081 ug/L)
- DDE (MDL = 0.0194 ug/L) and SLV = 0.00022 ug/L)
- DDD (MDL = 0.0147 ug/L and SLV = 0.00031 ug/L)
- DDT (MDL = 0.0190 ug/L and SLV = 0.00022 ug/L)
- Dieldrin (MDL = 0.0144 ug/L and SLV = 0.000054 ug/L)
- Toxaphene (MDL = 0.610 ug/L and SLV = 0.0002 ug/L)

4.2.7 Total Petroleum Hydrocarbons

There are no SLVs for TPH.

4.3 GROUNDWATER INFILTRATION TO STORM DRAIN PIPE PATHWAY

Groundwater infiltration to the storm drainage system is a potential source for contributing to the stormwater pathway. There are two ways that shallow groundwater can form a complete pathway. The first is through infiltration into leaking/cracked storm drain pipes and the second is by being conveyed in the material the storm drain pipe is embedded in.

The groundwater monitoring data being completed for the WTG was reviewed and a summary of the data is noted in Section 4.2.2. Although several of the wells showed groundwater to be less than 8 feet deep, water quality analysis was not obtained. Due to the lack of analytical data, additional evaluation is recommended as discussed in Section 5.3 below.

4.4 NATURALLY OCCURRING BACKGROUND LEVELS OF ARSENIC

Per the Chevron Source Control Evaluation Report (ARCADIS 2009), arsenic is a naturally occurring heavy metal in the soils of the Willamette Basin. References suggest that arsenic groundwater concentrations are likely linked to regional geography and are therefore not considered a site contaminant.

4.5 SUMMARY OF SLV EXCEEDANCES

A summary of the catch basin sediment and stormwater data SLV exceedances is provided in the tables below. In each table, the “E” references that a data result exceeded the SLV for that constituent. The number in (#) after the “E” identifies the number of events where the SLV was exceeded.

Table 6a. Summary of Catch Basin Sediment Data Exceeding JSCS SLVs – Metals

Location		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
SLV – toxicity (mg/kg)		33	4.98	111	149	128	1.06	48.6	459
SLV – bioaccumulation		7	1	N/A	N/A	17	0.07	N/A	N/A
Tank Farm 1, Outfall 22	CB-01						E		E
	CB-10	E		E	E			E	E
	CB-16			E				E	
	CB-17								E
	CB-48		E			E			E
	Area 5	E	E			E	E		E
Tank Farm 2, Outfall 22	CB-18			E		E	E	E	
	CB-23	E	E	E	E	E		E	E
	Area 8		E			E			E
Tank Farm 3, Outfall 19	CB-32		E						E
	CB-35				E	E		E	E
	CB-42		E				E		
Dock Area	CB-B	E	E			E			E
	CB-C		E						E
	Area 4	E	E			E	E		E

E: Sampling data exceeded JSCS Screening Level Value

Table 6b. Summary of Catch Basin Sediment Data Exceeding JSCS SLVs – Non-Metals

Location		PAHs											Phthalates		
		Acenaphthene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo (g,h,i) perylene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene	2-Methyl naphthalene	Di-n-butylphthalate	Bis(2-ethylhexyl) phthalate	Gamma-BHC
SLV (ug/kg)		300	1,050	1,450	300	1,290	2,230	536	100	1,170	1,520	200	100	800	4.99
Tank Farm 1, Outfall 22	CB-01		E	E	E	E	E		E	E	E			E	
	CB-10												E		
	CB-16													E	
	CB-17				E									E	
	CB-48		E	E	E	E	E		E	E	E			E	
	Area 5								E						
TF2, Outfall 22	CB-18				E				E					E	
	CB-23														E
	Area 8								E						
TF 3, Outfall 19	CB-32													E	
	CB-35													E	
	CB-42													E	
Dock Area	CB-B	E						E		E	E	E		E	
	CB-C													E	
	Area 4														

E: Sampling data exceeded JSCS Screening Level Value

Table 7. Summary of Stormwater Data Exceeding JSCS SLVs

Location		Metals								PAHs		
		Arsenic	Cadmium	Copper	Lead	Manganese	Silver	Zinc	Butylbenzyl phthalate	Naphthalene	Chrysene	Benzo(b) fluoranthene
SLV (ug/L)		0.045	0.094	2.7	0.54	50	0.12	36	3	0.2	0.018	0.018
Tank Farm 1, Outfall 22	MH-12 4-inch	E (3)		E (3)	E (2)		E (1)	E (3)	E (1)			
	MH-12 6-inch	E (2)		E (2)	E (2)			E (1)				
	MH-12 12-inch	E (4)		E (3)	E (4)	E (1)		E (4)			E (2)	E (2)
	MH-X	E (1)			E (1)			E (1)				
TF 2, OF 22	MH-3	E (4)		E (4)	E (4)			E (1)				E (1)
Tank Farm 3, OF 19	CB-42	E (3)	E (1)	E (3)	E (3)			E (1)	E (3)	E (1)		E (2)
	SEP-001	E (3)	E (3)	E (3)	E (3)			E (3)				E (1)
Dock Area	WR-012		E (1)	E (2)	E (4)			E (4)				
	WR-369	E (2)		E (4)	E (4)			E (4)				
	WR-370	E (4)		E (4)	E (4)	E (3)		E (4)			E (1)	

E (#): Sampling data exceeded JSCS Screening Level Value in # of the four events sampled

4.6 IDENTIFICATION OF SITE CHEMICALS OF POTENTIAL CONCERN

The JSCS states that exceedances of a constituent above the SLV does not necessarily indicate that the source poses an unacceptable risk to human health or the environment, but that it does require additional consideration. Data results screened against the SLVs were evaluated to determine the location, frequency, and magnitude of the SLV exceedances to determine the Chemicals of Potential Concern (COPC) for additional source control measures.

The following constituents were found in exceedances of SLVs in both catch basin sediment and stormwater results from multiple events at the site:

- Arsenic
- Cadmium
- Copper
- Lead
- Zinc (also noted as COI in Portland Outfall 22)
- Chrysene

Constituents that exceeded SLVs in more than one location in catch basin sediment but not stormwater include:

- Benzo(a)anthracene was found in catch basin sediment in two locations in Tank Farm 1
- Benxo(a)pyrene was found in catch basin sediment in two locations in Tank Farm 1
- Benzo(g,h,i)perylene was found in catch basin sediment at four locations (Tank Farm 1 and Tank Farm 2)
- Fluoranthene was found in catch basin sediment in two locations in Tank Farm 1
- Indeno(1,2,3-cd)pyrene was found in catch basin sediment at two locations (Tank Farm 1 and Tank Farm 2) – also noted as COI in Portland Outfall 22
- Phenanthrene was found in catch basin sediment at three locations in Tank Farm 1 and the Dock Area
- Pyrene was found in catch basin sediment at three locations in Tank Farm 1 and the Dock Area
- Bis(2-ethylhexyl)phthalate was found in catch basin sediment throughout the Site

Constituent that appeared widespread in stormwater results, but not catch basin sediment include:

- Butylbenzyl phthalate was found in stormwater at two locations (Tank Farm 1 at one event and Tank Farm 3 at three events)
- Naphthalene was found in stormwater at one location (CB-42, Tank Farm 3, Outfall 19) at 3 events
- Benzo(b)fluoranthene was found in stormwater at four locations during two events

4.6.1 Metals

Listed below is the largest magnitude by which the results exceeded the SLV:

- Arsenic (16.9 times the SLV on April 27, 2010 in stormwater and 7.8 times the SLV for toxicity in catch basin sediment)
- Cadmium (24 times the SLV on October 18, 2008 in stormwater, however the next largest exceedances are 1.9 times the SLV on May 26, 2010 stormwater and 2.9 times the SLV in the catch basin sediment)
- Copper (50 times the SLV on March 25, 2010 in stormwater, however the next largest exceedances are 2.6 times the SLV on March 25 and May 26, 2010 and 3.3 times the SLV in catch basin sediment
- Lead (40.1 times the SLV on March 25, 2010, however the next largest exceedances are 20.9 times the SLV on October 31, 2008 in stormwater and 6.5 times the SLV in catch basin sediment)
- Zinc (17.7 times the SLV on October 31, 2008 in stormwater, however the next largest exceedances are 4.2 times the SLV on March 25, 2010 stormwater and 2.5 times the SLV in catch basin sediment)

4.6.2 PAHs

Listed below is the largest magnitude by which the results exceeded the SLV:

- Chrysene (2.7 times the SLV on April 27, 2010 stormwater and 2.4 times the SLV in catch basin sediment)
- Benzo(a)anthracene (1.5 times the SLV in catch basin sediment)
- Benzo(a)pyrene (1.8 times the SLV in catch basin sediment)

- Benzo(g,h,i)perylene (13 times the SLV in catch basin sediment)
- Fluoranthene (1.5 times the SLV in catch basin sediment)
- Naphthalene (1.4 times the SLV on May 26, 2010 stormwater)
- Indeno(1,2,3-cd)pyrene (30 times the SLV in catch basin sediment)
- Phenanthrene (10.6 times the SLV in catch basin sediment, however the next highest exceedances were 1.5)
- Pyrene (2.4 times the SLV in catch basin sediment)
- Benzo(b)fluoranthene (4 times the SLV on April 27 and May 26, 2010 stormwater)

4.6.3 Phthlate Esters

Listed below is the largest magnitude by which the results exceeded the SLV:

- Butylbenzylphthalate (10.3 times the SLV on April 8, 2010 stormwater)
- Bis(2-ethylhexyl)phthalate (57 times the SLV in catch basin sediment)

4.6.4 COPCs Identified for the Site

Based on the above information, the COPCs for the site include:

- Arsenic
- Cadmium
- Copper
- Lead
- Zinc
- Chrysene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Indeno(1,2,3-cd)pyrene
- Bis(2-ethylhexyl)phthalate

5.0 Source Control Effectiveness and Recommendations

5.1 CATCH BASIN BMP EFFECTIVENESS

Several COIs exceeded SLVs in catch basin sediment but not stormwater runoff. This indicates that the catch basins are working effectively, trapping the constituents and preventing them from being released into stormwater and conveyed to the Willamette River. Constituents that were found to exceed SLVs in catch basin sediment but not stormwater runoff include:

- Benzo(g,h,i)perylene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene
- Pyrene
- Bis(2-ethylhexyl)phthalate

Performing regular catch basin inspection and maintenance is the most effective way to ensure the catch basins continue to effectively remove pollutants. In addition to catch basin maintenance, street sweeping is recommended to capture additional sediment from ground surfaces at the Site.

5.2 STORMWATER BMP EFFECTIVENESS

There are very few COIs that were found to exceed SLVs in stormwater but not catch basin sediment. These COIs include manganese, silver, naphthalene, and benzo(b)fluoranthene.

5.3 RECOMMENDATIONS

Based on the data reviewed as part of the Source Control Evaluation, the site should not be considered a significant source of ongoing contamination to Portland's storm drain system or the Willamette River. The BMPs being implemented per the SWPCP are beneficial to reducing the COIs from discharging to the Portland storm drain system and the Willamette River. However, there are additional measures that are recommended to further improve the quality of water discharging to the Willamette River via the stormwater pathway:

- Although groundwater was not observed in the manholes during dry weather, it is recommended to implement a dry weather screening program of the storm drainage system on the site. A Work Plan will be submitted to DEQ for approval prior to implementation and this evaluation should be completed during spring when groundwater elevations are at their highest level. If water is observed during dry periods, follow up with video surveillance will occur, along with additional storm drain lining or repair as necessary.

- Street sweeping should be conducted on an annual basis at the end of the summer prior to the rainy season. Street sweeping should be documented and reports should be maintained.

TABLE 1
BULK STORAGE TANKS

Tank Number	Product Stored	Type of Construction	Maximum Capacity (gal)
Tank Farm 1			
31	Residual Fuel Oil	Riveted Steel	1,557,320
36	Stop Oil	Riveted Steel	21,960
141	Out of Service	Riveted Steel	1,825,780
1471	Guardol 10W	Riveted Steel	19,450
2561	Marine Fuel Oil	Riveted Steel	1,668,775
2579	Guardol 10W	Welded Steel	20,150
2669	Marine Diesel	Riveted Steel	475,800
2713	Unax AW 46	Welded Steel	119,870
2714	Guardol 15/40	Welded Steel	119,870
2783	Decant Oil	Riveted Steel	984,480
2784	Diesel #2	Riveted Steel	1,456,940
2917	600 Neutral	Welded Steel	649,965
3623	HiTec 4963A	Welded Steel	19,930
3639	Guardol 330	Welded Steel	131,850
4369	Drying Tank for 600 Neutral	Welded Steel	20,035
4441	Puradd AP-96	Welded Steel	20,370
Tank Farm 2			
2915*	Unleaded Gasoline	Welded Steel	3,450,480
2916	Diesel #2	Welded Steel	1,717,760
2982	Kerosene	Welded Steel	488,995
2983	150 Neutral	Welded Steel	320,640
3407	Unleaded Gasoline	Welded Steel	3,272,525
3408*	Unleaded Gasoline	Welded Steel	1,850,000
3409	Unleaded Gasoline	Welded Steel	1,119,335
3410	Ethanol	Welded Steel	261,475
3411	Unleaded Gasoline	Welded Steel	291,255
3412	Kerosene	Welded Steel	291,350
3413	Unleaded Gasoline	Welded Steel	291,225
4223	Stop Oil	Welded Steel	20,450
4259	Transmix	Welded Steel	228,650
4327	Gasoline Slops	Welded Steel	11,970
Tank Farm 3			
3414	150 Neutral	Welded Steel	222,360
3415	1391 Neutral	Welded Steel	222,360
3416	150 Neutral	Welded Steel	222,450
3417	100 Neutral	Welded Steel	222,450
3579	Industrial Fuel Oil	Welded Steel	3,367,390
3739	150 Bright Stock	Welded Steel	222,550
3740	600 Neutral	Welded Steel	302,985
3761	Diesel #2	Welded Steel	3,297,705
4244	Exxon 1391	Welded Steel	20,350
4245	Drying Tank for 150 Bright Stock	Welded Steel	20,110
4252	Residual Fuel Oil	Welded Steel	409,670

*Tank is under the jurisdiction of the Department of Transpoortation

TABLE 1
BULK STORAGE TANKS

Tank Number	Product Stored	Type of Construction	Maximum Capacity (gal)
4253	Residual Fuel Oil	Welded Steel	410,005
4254	PS 300	Welded Steel	410,215
4255	Out of Service	Welded Steel	410,215
4256	Out of Service	Welded Steel	229,570
4257	Out of Service	Welded Steel	57,870
4258	Talusia HR 70	Welded Steel	20,185
4266	Flush	Welded Steel	20,020
4302	Exxon 150 Neutral	Welded Steel	20,250
4303	Exxon 100 Neutral	Welded Steel	20,250
4305	Out of Service	Welded Steel	10,250
4306	Exxon 150 Neutral	Welded Steel	223,415
4318	Marine Fuel Oil	Welded Steel	1,504,020
4320	Super 10/30	Welded Steel	42,120
4321	Uniguide 100	Welded Steel	42,170
4322	Hydraulic Tractor Fluid	Welded Steel	42,130
4323	Super ATF	Welded Steel	42,140
F103	Out of Service	Welded Steel	29,310
F104	Evergreen 100 Neutral	Welded Steel	21,685
F-Tank Farm			
4335	FB AW 46 Utility	Welded Steel	19,985
4336	Unax AW 68	Welded Steel	19,980
4337	Unax PC AW 46 Utility	Welded Steel	19,985
4436	Unax AW 68	Welded Steel	19,920
4437	Unax WR 32	Welded Steel	19,930
F10	Out of Service	Welded Steel	6,380
F11	Out of Service	Welded Steel	6,380
F12	Out of Service	Welded Steel	6,380
Upper Lube Cell			
3741	Ramar CLF 17	Welded Steel	20,065
3742	MP 80/90	Welded Steel	20,045
3743	Out of Service	Welded Steel	21,030
3744	Golden Bear 100	Welded Steel	20,385
3745	Lubrizol 7365U	Welded Steel	20,835
3746	Lubrizol 4998T	Welded Steel	20,400
3747	HiTec 436	Welded Steel	20,400
3757	Lubrizol 9802L	Welded Steel	20,400
3760	Golden Bear 460	Welded Steel	20,385
4191	Lubrizol 4994C	Welded Steel	20,400
4192	HiTec 5755	Welded Steel	20,380
4241	Out of Service	Welded Steel	20,075
4242	Unax AW 32	Welded Steel	20,065
4243	PM 220	Welded Steel	20,065
4281	MP ATF	Welded Steel	20,080
4332	Super ATF	Welded Steel	19,980
4333	HydraulicAW 46	Welded Steel	19,985

TABLE 1
BULK STORAGE TANKS

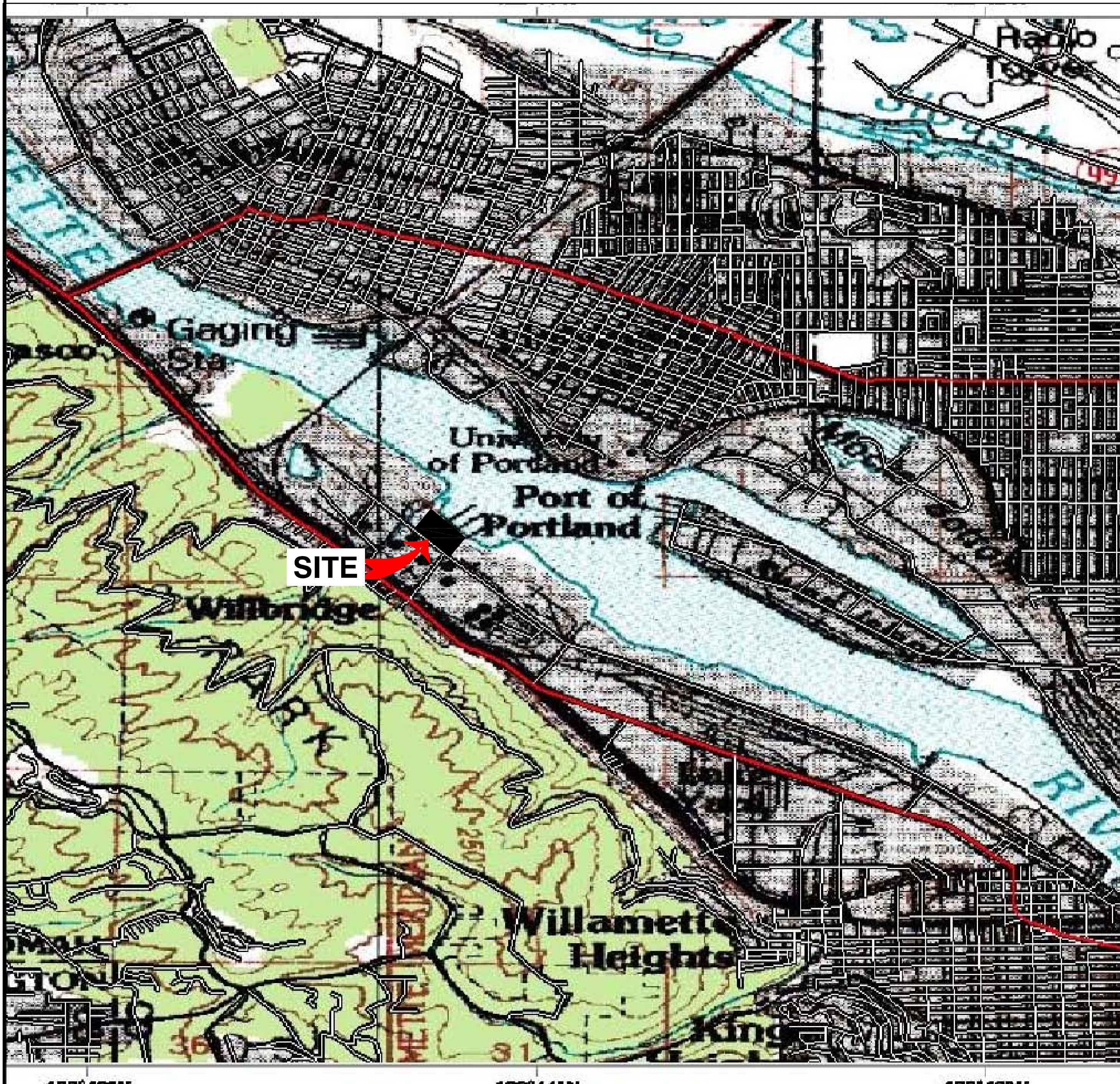
Tank Number	Product Stored	Type of Construction	Maximum Capacity (gal)
4334	Out of Service	Welded Steel	19,985
Lower Lube Cell			
4300	Ramar CLF 13	Welded Steel	28,690
4331	HiTec 6888	Welded Steel	28,680
4388	600 Neutral Utility	Welded Steel	15,415
4389	Out of Service	Welded Steel	15,494
4390	Bar & Chain 150	Welded Steel	15,490
4391	Uniguide 46 Utility	Welded Steel	15,485
4392	Firebird 15/40 Utility	Welded Steel	15,485
4393	150 Neutral Utility	Welded Steel	15,520
4394	Out of Service	Welded Steel	15,485
4395	Uniguide 40 Utility	Welded Steel	15,485
4397	MP 85/140	Welded Steel	15,010
4398	Talupac Utility	Welded Steel	14,995
4399	Firebird 15/40 Utility	Welded Steel	14,990
4400	Guardol 40	Welded Steel	15,015
4401	Golden Bear 22 Utility	Welded Steel	14,990
4402	ATF Type F	Welded Steel	14,985
4403	Firebird 10/30	Welded Steel	15,035
4404	Out of Service	Welded Steel	14,995
4405	Lubrizol 5178F	Welded Steel	15,430
4406	Lubrizol 9990A	Welded Steel	15,410
4407	Angiomol 9001U	Welded Steel	15,445
4408	Lubrizol 7075F	Welded Steel	15,445
Lube Blending Warehouse			
4338	Irganox 820P	Welded Steel	1,060
4339	Lubrizol 5704	Welded Steel	1,060
4340	HiTec 385	Welded Steel	1,060
4341	Acryloid 3105	Welded Steel	1,060
4342	Acryloid 154/70	Welded Steel	1,060
4343	Lubrizol 6477B	Welded Steel	1,060
4344	Emersol 213	Welded Steel	1,060
4345	OLOA 1255	Welded Steel	1,060
4346	Lubrizol 9692A	Welded Steel	1,060
4347	Lubrizol 4998	Welded Steel	1,060

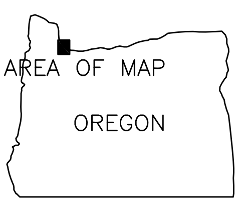
TABLE 3
SITE RELEASE HISTORY
ConocoPhillips Terminal
Portland, Oregon

	Date	Location	Estimated Volume	Product	Comment
1	01/21/79	Filter check valve	8,500	Leaded regular gasoline	Contained in separator system; 100 gal may have entered sanitary sewer
2	04/28/81	Tank 4254	100	Asphalt	Tank leak
3	09/10/81	Tank 2669	310	RR-40	Tank overfill
4	06/22/82	Underground flush tank	127	RRA-40	UST overfill
5	07/19/82	NA	800	NA	Product line cracked during annual pressure test
6	07/19/82	Union Oil Dock	1,000	Diesel	Line "Blow Out"
7	01/25/83	Tank 3761	20	Diesel	Tank leak
9	05/01/85	NA	15	NA	Tank overfill
10	05/30/85	Tank 4388	370	ATF	Tank overflow
11	06/11/85	Pipeline beneath Front Ave.	3,000	Fuel oil	Leak at broken flange gasket; 10 inch pipeline from Tank 3579
12	07/29/85	Tank car loading area	20	Oil	Flowed into sump drain
13	08/09/85	Tank 1289	40	Additive S-13	Tank overfill
14	03/14/86	Tank F-11	10	Additive	NA
15	03/14/86	Tank 4318	42	Asphalt (AR-400W)	Leaked from metering system
16	08/19/86	Heating vessel	200	Oil (450 Neutral)	Rupture of heating vessel
17	09/20/86	Electric steam pumps behind	84	Fuel Oil	Leaked from pump
18	01/26/87	Circulation pump	70	Additive R-12F	Leaked from pump
19	01/28/87	Dock	10	NA	Product spilled while disconnecting fuel hose from vessel
20	04/15/88	Loading rack	1,300	Diesel	Fully contained
21	NA/8/89	Tank 36	50	Fuel Oil	Drain overflowed
22	05/18/89	Fueling island	40	Diesel #2	Driver overfilled fueling tank (contained)
23	07/18/89	Tank car	300	Acryloid	Contained
24	11/24/89	Steam pump	210	Fuel oil	Spilled onto ground
25	12/17/89	Tank car	10	RR40	Steam coil leaked (contained)
26	04/26/90	Loading rack	72	Unleaded	Equipment malfunction (contained)
27	07/04/90	Dock	1	NA	Leaking gasket on abandoned asphalt line on dock
28	08/23/90	Lube loading rack	10	Gear Lube	Overflowed truck (contained)
29	09/13/90	Loading rack	10	Leaded regular	Spring Valve failed (contained)
30	05/06/91	Loading rack	50	Unleaded	Float failed (contained)
31	09/04/92	Flush tank	50	Flush oil	Overflowed (separator contained)
32	03/08/93	Ramar 20/40	2,900	Lube oil	Overflowed (separator contained)
33	11/02/95	Tank Farm	5,000	Block Oil	Malfunctioned pump
34	02/22/97	Tank 3411	11,700	Gasoline	Overfilled Tank 3411
35	12/19/97		2,500	Lube Oil	Equipment Failureat barrell filler, next to warehouse
37	06/15/00	Tank 2982, Tank Farm 2	6,540	Kerosene	Equipment malfunction (sampling valve vibrated open)
39	12/21/00	Tank 2669	55	Marine DieselOil	Pinhole in Tank
40	05/09/10	Shore Valve Area	5	MDO	dripping flange
41	10/07/09	TF# 1, Olympic Header	1	gasoline	diaphragm failed
42	08/10/09	TF#2, Pipeway 3409 & 3412	2	gasoline	stain on the ground under a 12' gasoline line flange
43	04/28/09	TF #3	1	fuel oil	dripping oil onto a pipe support
44	07/14/08	TF #2	3	diesel	hit by a vacuum truck & spilled
45	06/27/08	TF #2	1	ethanol	drip on ethanol pump pipe nipple
46	05/16/08	TF #2	<1	gasoline	thermal overpressure of 6" line
47	05/04/07	Tank 2784	1	diesel	drip from bubble in paint
48	03/04/07	TF #3	2	black oil	black oil line release

TABLE 3
SITE RELEASE HISTORY
ConocoPhillips Terminal
Portland, Oregon

	Date	Location	Estimated Volume	Product	Comment
49	01/20/07	Black Oil Manifold	17	black oil	pressure gauge on stream pump failed
50	11/16/07	F-Row	795	lube oil	tank overfill
51	11/10/05	Tank 36		slop	flange was leaking
52	08/19/05	TF #1	10	black oil	seeping from a 60" storm water outfall
53	09/10/05	Marine Dock	1	diesel	dripping from dock structure to river
54	08/12/05	TF #2	2	ethanol	drip on pressure relief line
55	06/30/05	Shore Valve Area	3	diesel	leak from valve in manifold area
56	06/17/05	Fire Suppression System	1	diesel	1 pint kerosene outside containment
57	04/06/05	Tank 2982	1	h/o #1	valved failed
58	10/15/04	Shore Valve Area	1	diesel	leak from valve in manifold area
		Total	**46,362**		





QUADRANGLE LOCATION

N

0 1/4 1/2

SCALE (MILES)

REFERENCE: USGS 7.5 MINUTE QUADRANGLE; PORTLAND, OREGON; 1999

Stantec
7730 SW MOHAWK STREET
TUALATIN, OREGON
PHONE: (503) 691-2030/692-7074 (FAX)

FOR:		SITE LOCATION MAP	FIGURE:
ConocoPhillips FACILITY 0922 - PORTLAND (RM&R 0922) 5528 NW DOANE AVENUE PORTLAND, OREGON			1
JOB NUMBER: 15CP.00922.40.8521	DRAWN BY: DJH	CHECKED BY: FAF	APPROVED BY: MAT	DATE: 9/2/08

6.0 References

Delta Consultants; *Semi-Annual Groundwater Monitoring Report October 2008 through March 2009*; June 12, 2009.

City of Portland; Portlandmaps.com; 2010

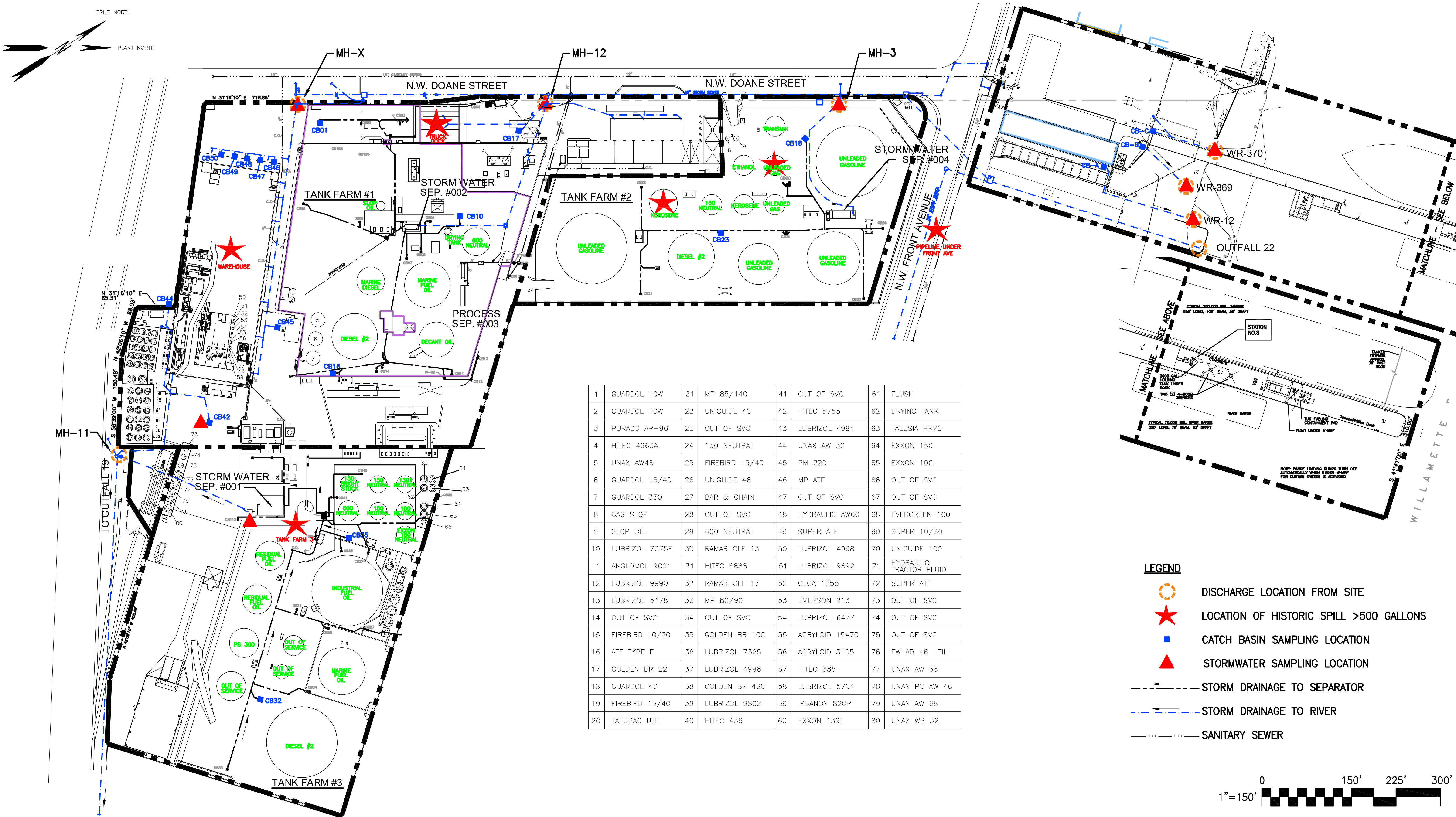
ConocoPhillips Portland Terminal NPDES Permit Renewal Application Permit No. GEN1300, File No. 90845; ConocoPhillips Company; May 17, 2004.

AMEC Earth & Environmental, Inc; *ConocoPhillips Combined Stormwater Pollution Control Plan (SWPCP) and Accidental Spill Prevention Plan (ASPP)*; August 17, 2009.

Framework for Portland Harbor Storm Water Screening Evaluations, December 2005, Department of Environmental Quality, Cleanup and Lower Willamette Section (Appendix D of Portland Harbor JSCS)

Portland Harbor Joint Source Control Strategy, December 2005, Department of Environmental Quality and United States Environmental Protection Agency.

KHM Environmental Management Inc., Final Upland Remedial Investigation Report Willbridge Facility, Portland, Oregon (August 2003)



1	GUARDOL 10W	21	MP 85/140	41	OUT OF SVC	61	FLUSH
2	GUARDOL 10W	22	UNIGUIDE 40	42	HITEC 5755	62	DRYING TANK
3	PURADD AP-96	23	OUT OF SVC	43	LUBRIZOL 4994	63	TALUSIA HR70
4	HITEC 4963A	24	150 NEUTRAL	44	UNAX AW 32	64	EXXON 150
5	UNAX AW46	25	FIREBIRD 15/40	45	PM 220	65	EXXON 100
6	GUARDOL 15/40	26	UNIGUIDE 46	46	MP ATF	66	OUT OF SVC
7	GUARDOL 330	27	BAR & CHAIN	47	OUT OF SVC	67	OUT OF SVC
8	GAS SLOP	28	OUT OF SVC	48	HYDRAULIC AW60	68	EVERGREEN 100
9	SLOP OIL	29	600 NEUTRAL	49	SUPER ATF	69	SUPER 10/30
10	LUBRIZOL 7075F	30	RAMAR CLF 13	50	LUBRIZOL 4998	70	UNIGUIDE 100
11	ANGLOMOL 9001	31	HITEC 6888	51	LUBRIZOL 9692	71	HYDRAULIC TRACTOR FLUID
12	LUBRIZOL 9990	32	RAMAR CLF 17	52	OLOA 1255	72	SUPER ATF
13	LUBRIZOL 5178	33	MP 80/90	53	EMERSON 213	73	OUT OF SVC
14	OUT OF SVC	34	OUT OF SVC	54	LUBRIZOL 6477	74	OUT OF SVC
15	FIREBIRD 10/30	35	GOLDEN BR 100	55	ACRYLOID 15470	75	OUT OF SVC
16	ATF TYPE F	36	LUBRIZOL 7365	56	ACRYLOID 3105	76	FW AB 46 UTIL
17	GOLDEN BR 22	37	LUBRIZOL 4998	57	HITEC 385	77	UNAX AW 68
18	GUARDOL 40	38	GOLDEN BR 460	58	LUBRIZOL 5704	78	UNAX PC AW 46
19	FIREBIRD 15/40	39	LUBRIZOL 9802	59	IRGANOX 820P	79	UNAX AW 68
20	TALUPAC UTIL	40	HITEC 436	60	EXXON 1391	80	UNAX WR 32

LEGEND

- DISCHARGE LOCATION FROM SITE
- LOCATION OF HISTORIC SPILL >500 GALLONS
- CATCH BASIN SAMPLING LOCATION
- STORMWATER SAMPLING LOCATION
- STORM DRAINAGE TO SEPARATOR
- STORM DRAINAGE TO RIVER
- SANITARY SEWER

0 150' 225' 300'
1"=150'

Note
1. Updated from Delta, Inc Drawing 0608-C-7011-C, Dated 3/16/97.

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(503) 297-1631

FOR: ConocoPhillips
PORTLAND TERMINAL
5528 NW DOANE AVENUE
PORTLAND, OREGON

SITE PLAN WITH TANK INVENTORY

FIGURE: 2

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
15CP.00922.43	DJH	J.ECKART	JLE	10.01.10

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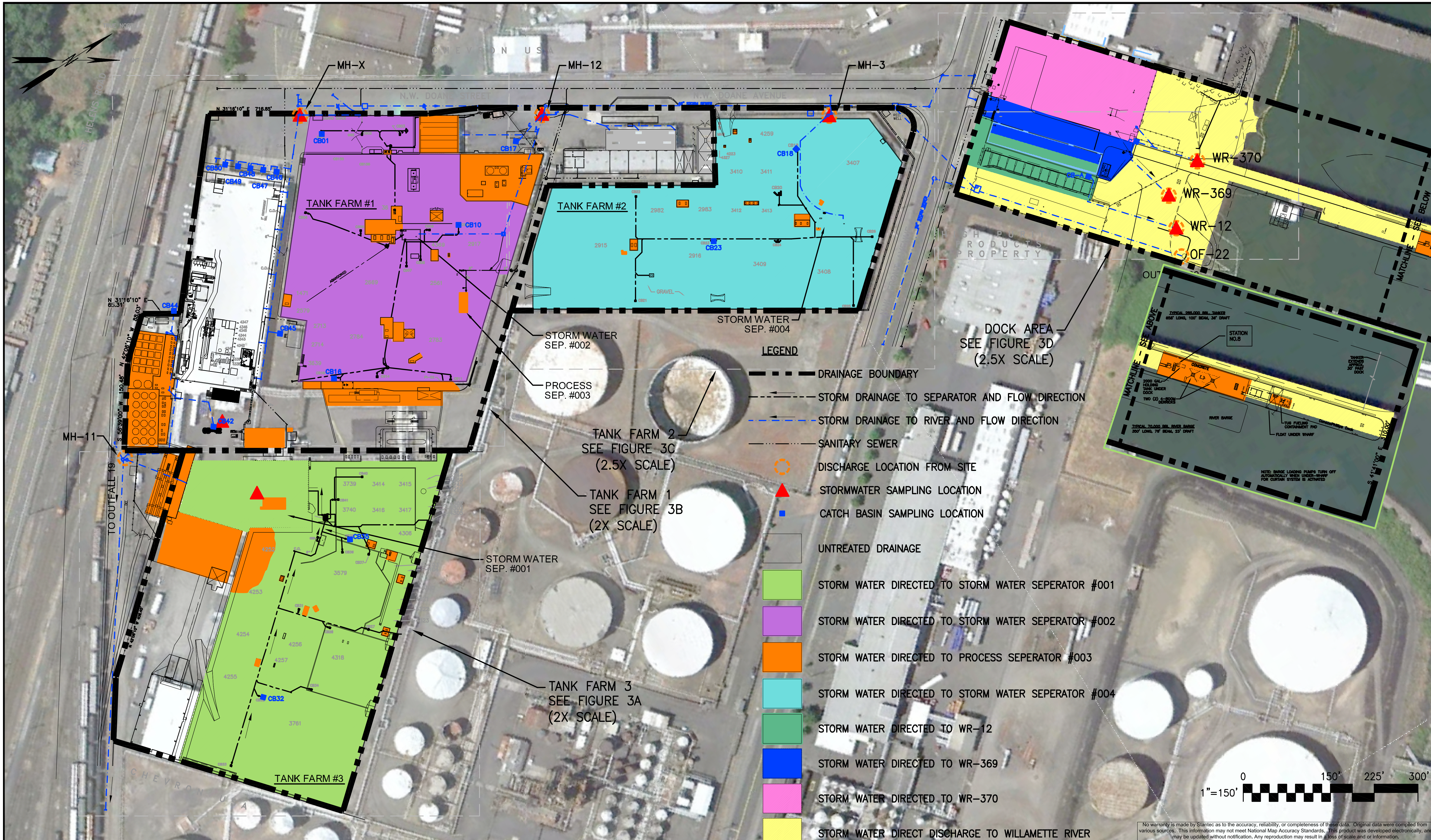

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Note

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Stantec 9400 SW BARNES ROAD, SUITE 200 PORTLAND, OR 97225 (503) 297-1631	FOR: ConocoPhillips PORTLAND TERMINAL 5528 NW DOANE AVENUE PORTLAND, OREGON	DRAINAGE PLAN		FIGURE: 3
	JOB NUMBER: 15CP.00922.43	DRAWN BY: DJH	CHECKED BY: J.ECKART	APPROVED BY: JLE	DATE: 10.01.10

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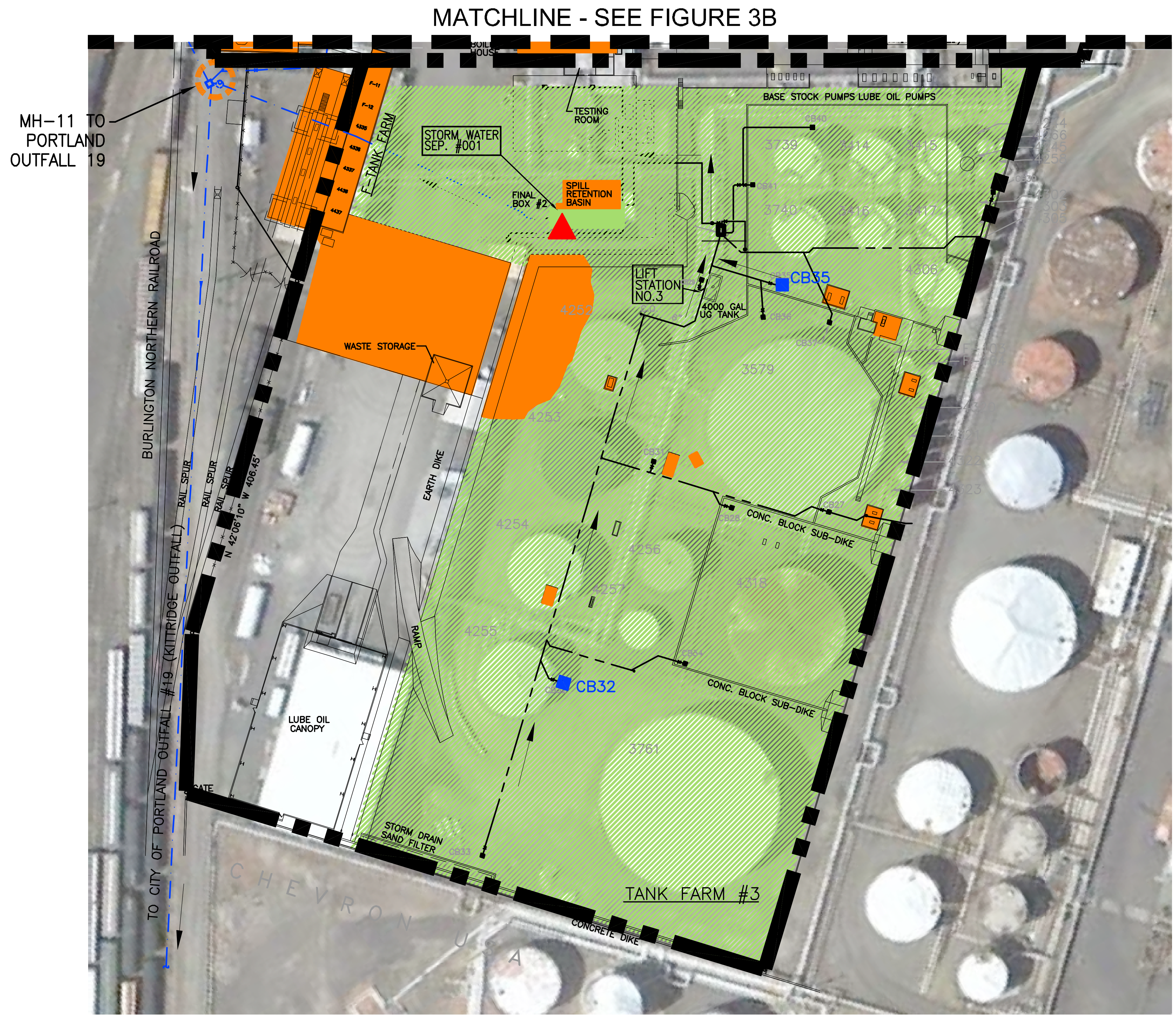

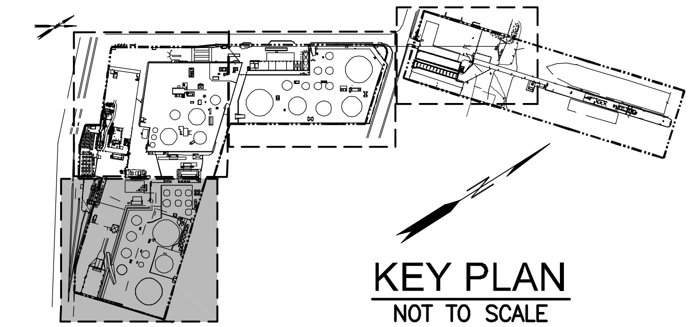

LEGEND

- DRAINAGE BOUNDARY
- STORM DRAINAGE TO SEPARATOR AND FLOW DIRECTION
- STORM DRAINAGE TO RIVER AND FLOW DIRECTION
- SANITARY SEWER
- DISCHARGE LOCATION FROM SITE
- STORMWATER SAMPLING LOCATION
- CATCH BASIN SAMPLING LOCATION
- MONITORING WELL LOCATIONS AND IDENTIFICATION
- STORM WATER DIRECTED TO STORM WATER SEPARATOR #001
- STORM WATER DIRECTED TO PROCESS SEPARATOR #003
- UNTREATED DRAINAGE

0 80' 120' 160'
1"=80'

Note
1. Updated from Delta, Inc Drawing 0608-C-7011-C, Dated 3/16/97.

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FOR: ConocoPhillips PORTLAND TERMINAL 5528 NW DOANE AVENUE PORTLAND, OREGON		DRAINAGE PLAN - TANK FARM 3		FIGURE: 3A
JOB NUMBER: 15CP.00922.53	DRAWN BY: DJH	CHECKED BY: NS	APPROVED BY: RAF	DATE: 10.01.10

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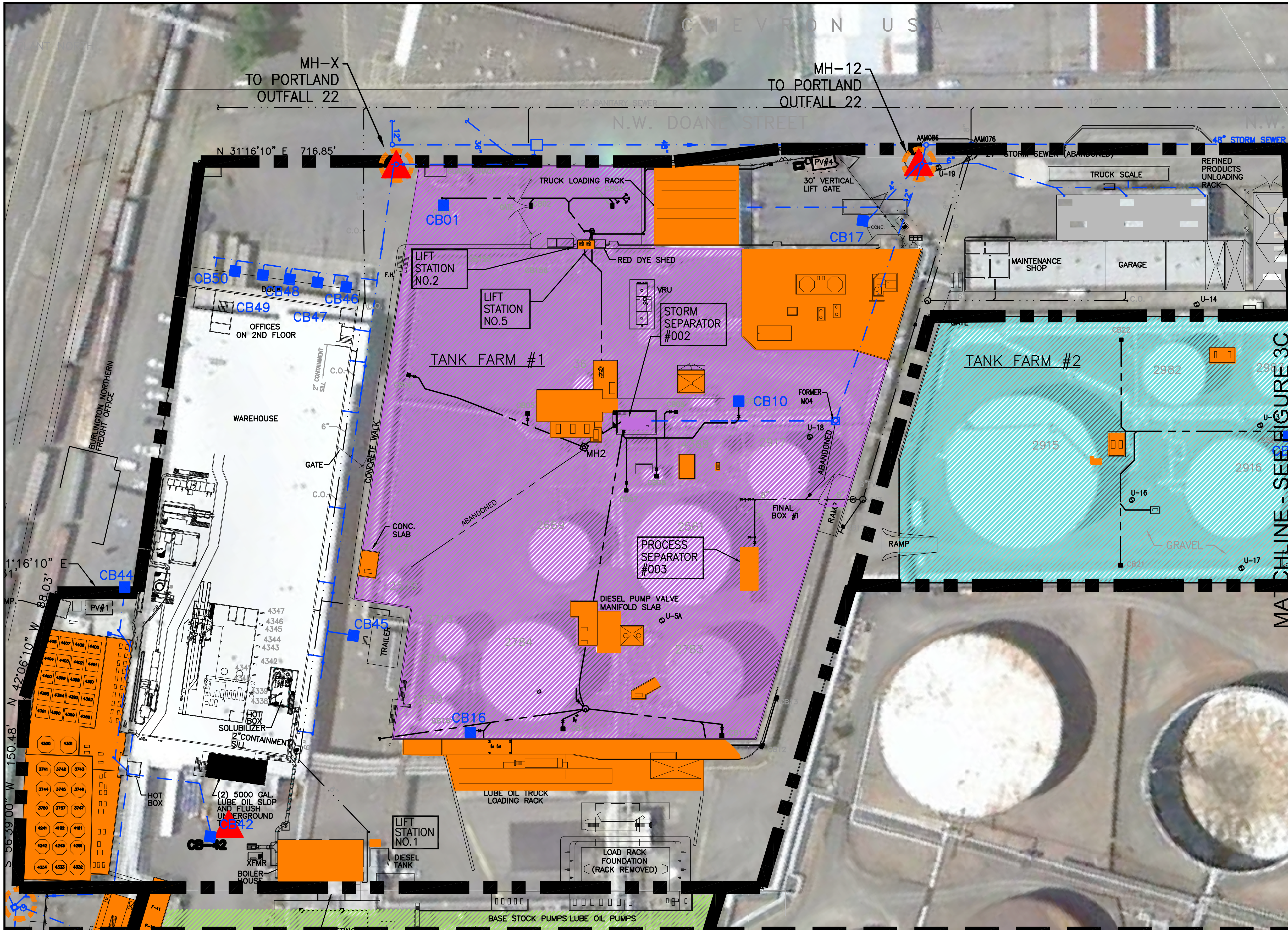

LEGEND

- DRAINAGE BOUNDARY
- STORM DRAINAGE TO SEPARATOR AND FLOW DIRECTION
- STORM DRAINAGE TO RIVER AND FLOW DIRECTION
- SANITARY SEWER
- DISCHARGE LOCATION FROM SITE
- STORMWATER SAMPLING LOCATION
- CATCH BASIN SAMPLING LOCATION
- MONITORING WELL LOCATIONS AND IDENTIFICATION
- STORM WATER DIRECTED TO STORM WATER SEPARATOR #002
- STORM WATER DIRECTED TO PROCESS SEPARATOR #003
- UNTREATED DRAINAGE

0 80' 120' 160'
1"=80'

Note

1. Updated from Delta, Inc Drawing 0608-C-7011-C, Dated 3/16/97.

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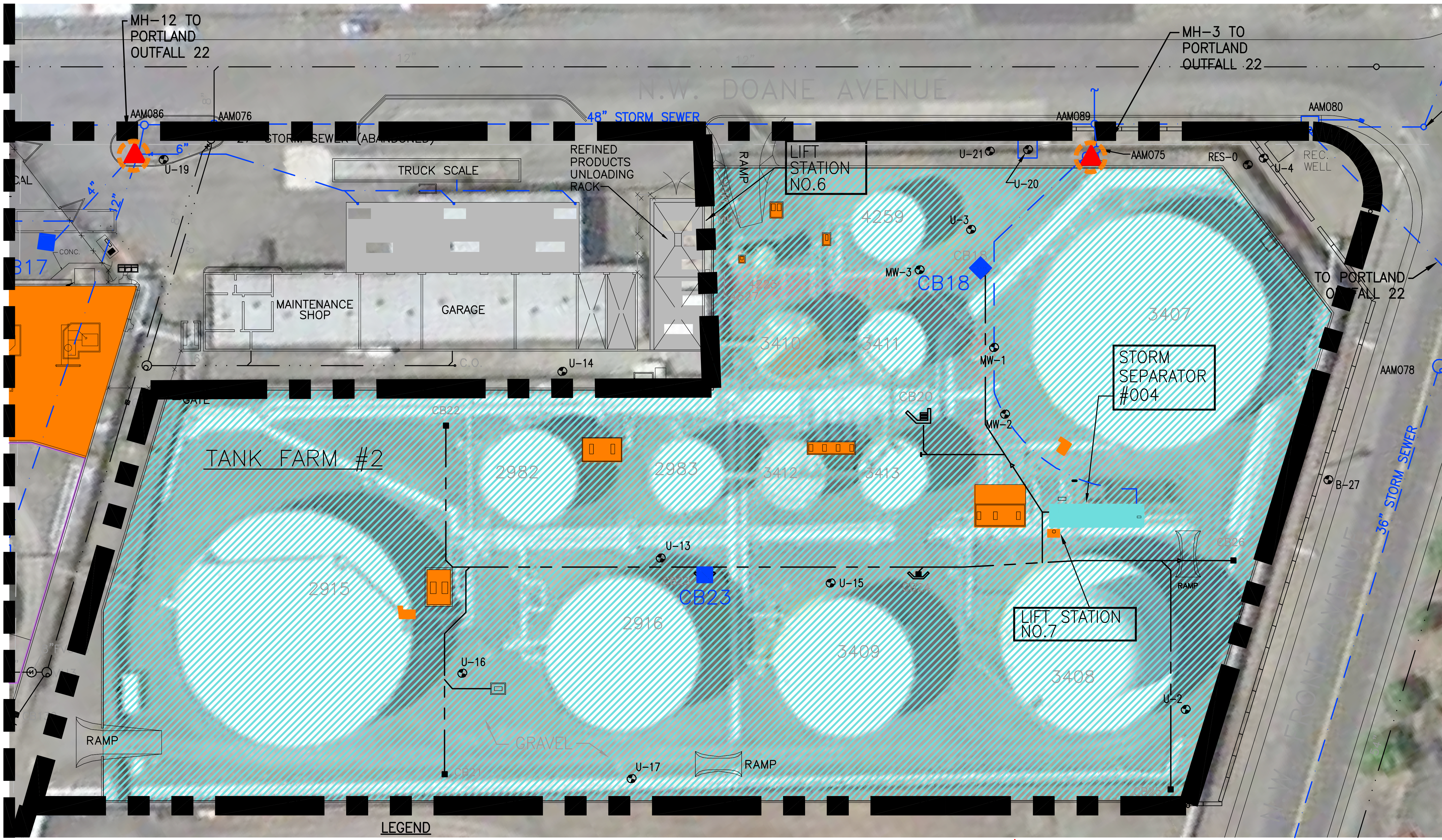
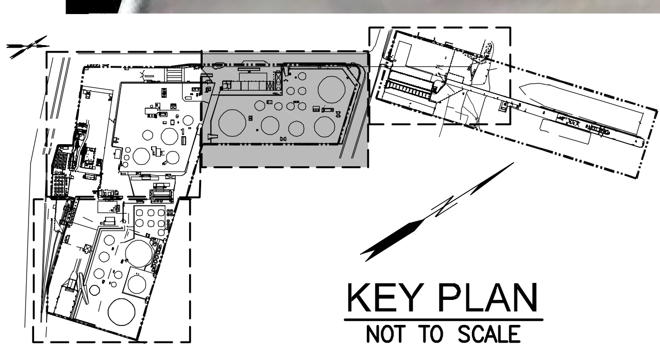
FOR: ConocoPhillips
PORTLAND TERMINAL
5528 NW DOANE AVENUE
PORTLAND, OREGON

DRAINAGE PLAN - TANK FARM 1

FIGURE: 3B

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
15CP.00922.43	DJH	J.ECKART	JLE	10.01.10





LEGEND

- DRAINAGE BOUNDARY
- STORM DRAINAGE TO SEPARATOR AND FLOW DIRECTION
- STORM DRAINAGE TO RIVER AND FLOW DIRECTION
- SANITARY SEWER
- DISCHARGE LOCATION FROM SITE
- MONITORING WELL LOCATIONS AND IDENTIFICATION
- STORM WATER DIRECTED TO PROCESS SEPARATOR #003
- STORM WATER DIRECTED TO STORM WATER SEPARATOR #004
- UNTREATED DRAINAGE
- STORMWATER SAMPLING LOCATION
- CATCH BASIN SAMPLING LOCATION

0 50' 75' 100'
1"=50'

Note
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FOR: ConocoPhillips
PORTLAND TERMINAL
5528 NW DOANE AVENUE
PORTLAND, OREGON

DRAINAGE PLAN - TANK FARM 2

FIGURE: 3C

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
15CP.00922.43	DJH	J.ECKART	JLE	10.01.10

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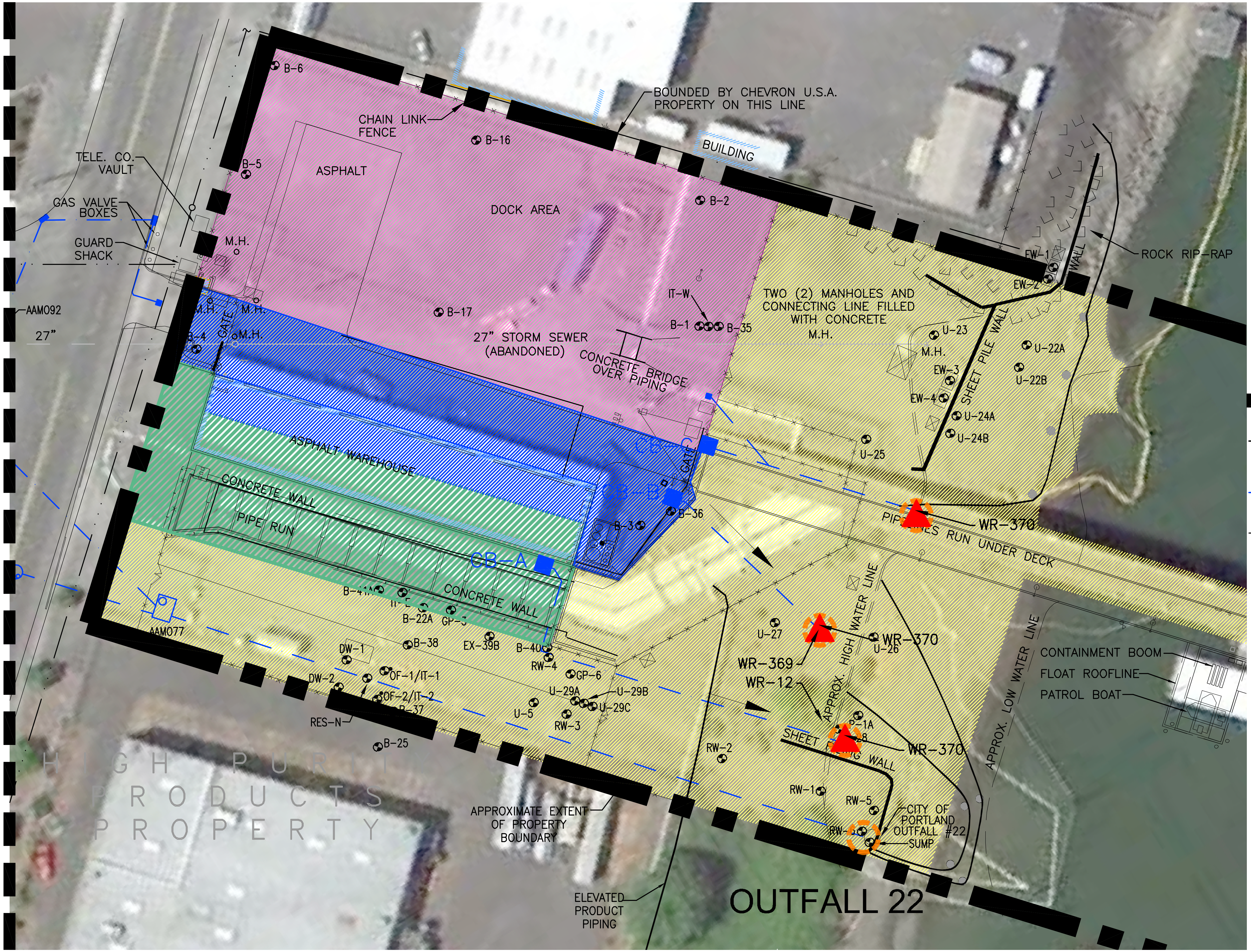
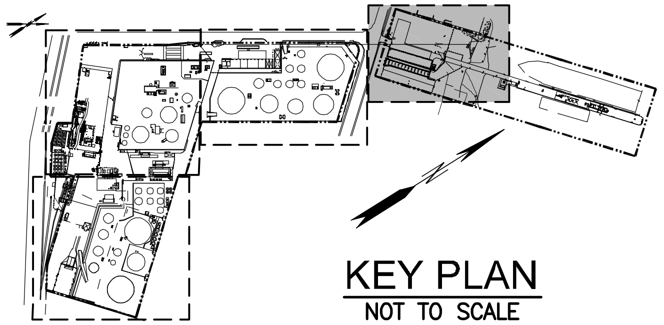
MATCHLINE - SEE FIGURE 3C





KEY PLAN
NOT TO SCALE

LEGEND

- SITE BOUNDARY
- STORM DRAINAGE TO SEPARATOR AND FLOW DIRECTION
- STORM DRAINAGE TO RIVER AND FLOW DIRECTION
- SANITARY SEWER
- DISCHARGE LOCATION FROM SITE
- STORMWATER SAMPLING LOCATION
- CATCH BASIN SAMPLING LOCATION
- MONITORING WELL LOCATIONS AND IDENTIFICATION
- STORM WATER DIRECTED TO WR-12
- STORM WATER DIRECTED TO WR-369
- STORM WATER DIRECTED TO WR-370

1"=50' 0 50' 75' 100'

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Note
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Stantec 9400 SW BARNES ROAD, SUITE 200 PORTLAND, OR 97225 (503) 297-1631	FOR: ConocoPhillips PORTLAND TERMINAL 5528 NW DOANE AVENUE PORTLAND, OREGON		DRAINAGE PLAN - DOCK AREA	FIGURE: 3D
	JOB NUMBER: 15CP.00922.53	DRAWN BY: DJH	CHECKED BY: NS / APPROVED BY: RAF	DATE: 10.01.10

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Appendix A

Catch Basin Sediment Analytical Results

- **Catch Basin Sediment Data Reporting and Screening Tables**
  - Data Compiled from Sampling Events Conducted by Delta (2007)
  - Data Compiled from Sampling Events Conducted by Stantec (2008 and 2010)
- **Raw Laboratory Results**
  - September 25-26, 2007
    - CB-17, CB-18, CB-23
  - September 24-25, 2007
    - CB-1, CB-10, CB-16, CB-32, CB-35, CB-42, CB-48, CB-B, CB-C
  - August 13, 2010
    - Area 4, Area 5, Area 8

APPENDIX A: CATCH BASIN DATA REPORTING AND SCREENING TABLE[a]
Data Compiled from Sampling Events conducted by Delta (2007)

		Truck Load Rack	Tank Farm 1			Truck Load Rack	Tank Farm 2		Tank Farm 3		Near Boiler House	Warehouse Loading Dock	Dock Area	
	Screening Value1	CB-1 9/25/07	CB-10 9/25/07	CB-10D 9/25/07	CB-16 9/25/07	CB-17 9/25/07	CB-18 9/26/07	CB-23 9/26/07	CB-32 9/24/07	CB-35 9/24/07	CB-42 9/25/07	CB-48 9/25/07	CB-B 9/24/07	CB-C 9/25/07
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Metals/Inorganics[7]														
Aluminum (pH 6.5 - 9.0)	--	**9,160,000**	**6,080,000**	**11,500,000**	**9,130,000**	**8,890,000**	**10,100,000**	**11,600,000**	**7,890,000**	**14,700,000**	**9,000,000**	**11,000,000**	**14,200,000**	**9,770,000**
Antimony	64,000	<754	**5,310**	**1,940**	**661**	<736	**7,460**	**55,600**	<694	<1,310	**1,760**	<969	<1,330	<704
Arsenic	7,000	**2,480**	**47,900**	**21,200**	**6,770**	**2,910**	**4,730**	**259,000**	**6,130**	**28,100**	**3,600**	**4,180**	**36,800**	**16,400**
Arsenic III	--													
Cadmium	1,000	**791**	<736	<727	<635	<736	<651	**2,270**	**1,540**	<1,310	**2,560**	**1,740**	**3,760**	**1,930**
Chromium, total	111,000	**36,800**	**131,000**	**42,700**	**144,000**	**21,900**	**277,000**	**343,000**	**111,000**	**45,200**	**42,100**	**90,300**	**39,100**	**24,600**
Chromium, hexavalent	--													
Copper	149,000	**89,100**	**179,000**	**56,900**	**87,200**	**41,600**	**61,400**	**497,000**	**85,300**	**157,000**	**93,900**	**102,000**	**131,000**	**105,000**
Lead	17,000	**72,400**	**119,000**	**62,900**	**108,000**	**54,500**	**280,000**	**973,000**	**116,000**	**177,000**	**77,800**	**220,00**	**197,000**	**97,800**
Manganese	1,100,000	**248,000**	**385,000**	**348,000**	**326,000**	**216,000**	**424,000**	**799,000**	**399,000**	**660,000**	**313,000**	**488,000**	**577,000**	**321,000**
Mercury[6]	70	**147**	<83.6	<81.0	<70.0	<114	**238**	<79.4	<111	**976**	<145	<181	<199	<85.3
Methyl Mercury	--													
Nickel	48,600	**21,900**	**50,400**	**23,800**	**55,100**	**22,800**	**172,000**	**97,000**	**23,500**	**55,400**	**30,500**	**35,800**	**24,900**	**19,400**
Selenium	2,000													
Silver	5,000													
Zinc	459,000	**503,000**	**1,220,000**	**601,000**	**135,000**	**878,000**	**342,000**	**2,540,000**	**1,300,000**	**1,000,000**	**455,000**	**1,530,000**	**779,000**	**1,160,000**
Perchlorate	--													
Cyanide	--													
Butyltins														
Monobutyltin	--													
Dibutyltin	--													
Tributyltin	2.3													
Tetrabutyltin	--													
PCBs Aroclors[5]														
Aroclor 1016	530	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<8.54	<17.9	<16.7	<27.7	<13.4	<17.1	<9.56
Aroclor 1221	--	<39.5	<39.4	<40.5	<16.8	<19.9	<18.1	<17.2	<36.1	<33.6	<55.8	<27.0	<34.5	<19.2
Aroclor 1232	--	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<8.54	<17.9	<16.7	<27.7	<13.4	<17.1	<9.56
Aroclor 1242	--	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<8.54	<17.9	<16.7	<27.7	<13.4	<17.1	<9.56
Aroclor 1248	1,500	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<8.54	<17.9	<16.7	<27.7	<13.4	<17.1	<9.56
Aroclor 1254	300	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<42.7	**28.9**	<16.7	<27.7	<13.4	<17.1	**13.4**
Aroclor 1260	200	<19.7	<19.6	<20.1	<8.37	<9.89	<9.00	<8.54	<17.9	<16.7	<27.7	<13.4	<17.1	<9.56
Aroclor 1262	--													
Aroclor 1268	--													
Total PCBs	0.39													
PCB Congeners														

Units	Screening Value1	CB-1 9/25/07	CB-10 9/25/07	CB-10D 9/25/07	CB-16 9/25/07	CB-17 9/25/07	CB-18 9/26/07	CB-23 9/26/07	CB-32 9/24/07	CB-35 9/24/07	CB-42 9/25/07	CB-48 9/25/07	CB-B 9/24/07	CB-C 9/25/07
	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
All 209 PCB congener target analytes														
3,3',4,4'-TCB	0.052													
3,4,4',5-TCB	0.017													
2,3,3',4,4'-PeCB	0.017													
2,3,4,4',5-PeCB	0.017													
2,3',4,4',5-PeCB	0.12													
2',3,4,4',5-PeCB	0.21													
3,3',4,4',5-PeCB	0.00005													
2,3,3',4,4',5'-HxCB	0.21													
2,3,3',4,4',5-HxCB	0.21													
2,3',4,4',5,5'-HxCB	0.21													
3,3',4,4',5,5'-HxCB	0.00021													
2,3,3',4,4',5,5'-HpCB	1.2													
Chlorinated Herbicides														
Dalapon	--													
Dicamba	--													
MCPA	--													
Dichlorprop	--													
2,4-D	--													
2,4,5-TP (Silvex)	--													
2,4,5-T	--													
2,4-DB	--													
Dinoseb	--													
MCPP	--													
Organochlorine Pesticides[8]														
α - BHC	--	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
β - BHC	--	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<8.62
γ - BHC (Lindane)	4.99	<9.88	<9.79	<10.1	<8.41	<9.96	<4.31	5.82	<18.0	<16.8	<13.9	<13.5	<13.8	<9.61
δ - BHC	--	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Heptachlor	10	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Heptachlor epoxide	16	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Aldrin	40	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Chlordane	0.37	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Endosulfan alpha-	--	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Endosulfan beta-	--	<3.95	<3.95	<4.05	<3.37	<9.96	<7.24	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Endosulfan sulfate	--	<3.95	<3.95	<4.05	<8.42	<9.96	<3.62	<3.44	<90.1	<6.72	<5.58	<5.39	<6.90	<9.62
DDE	0.33													
DDD	0.33													
DDT	0.33													
DDT - total (DDE+DDD+DDT)	0.33													
Dieldrin	0.0081													
Endrin	207	<3.95	<3.95	<4.05	<3.37	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<5.39	<6.90	<3.85
Endrin aldehyde	--	<9.87	<3.95	<4.05	<8.42	<9.96	<3.62	<3.44	<18.0	<6.72	<5.58	<13.5	<6.90	<9.62
Endrin ketone	--	<9.87	<3.95	<4.05	<8.42	<9.96	<3.62	<3.44	<90.1	<6.72	<5.58	<13.5	<6.90	<9.62
Methoxychlor	--	<9.87	<3.95	<4.05	<8.42	<39.8	<36.2	<8.60	<90.1	<6.72	<5.58	<20.1	<6.90	<9.62
Toxaphene	--	<737	<294	<453	<754	<1,190	<945	<642	<1,080	<502	<1,040	<1,010	<515	<431
oxy chlordane	--													

	Screening Value1	CB-1 9/25/07	CB-10 9/25/07	CB-10D 9/25/07	CB-16 9/25/07	CB-17 9/25/07	CB-18 9/26/07	CB-23 9/26/07	CB-32 9/24/07	CB-35 9/24/07	CB-42 9/25/07	CB-48 9/25/07	CB-B 9/24/07	CB-C 9/25/07
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
cis - nonachlor	--													
trans - nonachlor	--													
Volatile Organic Compounds[9]														
1,1,1,2- Tetrachloroethane	--													
1,1,1- Trichloroethane (TCA)	--													
1,1,2,2- Tetrachloroethane	--													
1,1,2- Trichloroethane	--													
1,1- Dichloroethane	--													
1,2,3- Trichloropropane	--													
1,2- Dichloroethane (EDC)	--	<5.0	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<10	<25	<5.0	<5.0
cis-1,2-Dichloroethlyene	--													
1,2- Dichloropropane	--	<5.0	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<10	<25	<5.0	<5.0
1,2- Dibromoethane (EDB)	--													
2- Butanone (MEK)	--													
2- Chloroethyl Vinyl Ether	--													
2- Hexanone	--													
4- Methyl-2-Pentanone (MIBK)	--													
Acetone	--													
Acrolein	--													
Acrylonitrile	--													
Bromochloromethane	--													
Bromodichloromethane	--													
Bromoform	--													
Bromomethane	--													
Carbon Disulfide	--													
Carbon Tetrachloride	--													
Chlorobenzene	--													
Chlorodibromomethane	--													
Chloroethane	--													
Chloroform	--													
Chloromethane	--													
cis-1,2-dichloroethylene	--													
cis-1,3-Dichloropropene	--													
Dibromomethane	--													
Dichlorodifluoromethane	--													
Iodomethane (Methyl Iodide)	--													
Isopropylbenzene	--	11	<5.0	<5.0	<5.0	50	<5.0	<5.0	<5.0	<5.0	<10	<25	<5.0	<5.0
Methylene chloride	--													
Styrene	--													
trans-1,4-Dichloro-2-butene	--													
Trichlorofluoromethane	--													
Vinyl Acetate	--													
Benzene	--	<5.0	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<10	<25	<5.0	<5.0
EthylBenzene	--	**32**	<5.0	<5.0	<5.0	<50	**5.5**	<5.0	**8.3**	<5.0	<10	<25	<5.0	<5.0
m,p-Xylene	--													
o-Xylene	--													
Xylenes (total)	--	**180**	<5.0	<5.0	<5.0	<50	**30**	<5.0	**47**	<5.0	**15**	<25	6.0	<5.0
Methyltert-butyl ether	--	<5.0	<5.0	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<10	<25	<5.0	<5.0

	Screening Value1	CB-1 9/25/07	CB-10 9/25/07	CB-10D 9/25/07	CB-16 9/25/07	CB-17 9/25/07	CB-18 9/26/07	CB-23 9/26/07	CB-32 9/24/07	CB-35 9/24/07	CB-42 9/25/07	CB-48 9/25/07	CB-B 9/24/07	CB-C 9/25/07
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Tetrachloroethene (PCE)	500													
Toluene	--	**130**	<5.0	<5.0	<5.0	<50	<5.0	<5.0	**8.0**	<5.0	**470**	**16,000**	<5.0	<5.0
trans-1,2-Dichloroethene	--													
trans-1,3-Dichloropropene	--													
Trichloroethene (TCE)	2,100													
Vinyl Chloride	--													
Semivolatile Organic Compounds														
Halogenated Compounds														
1,2-Dichlorobenzene	1,700													
1,3-Dichlorobenzene	300													
1,4-Dichlorobenzene	300													
1,2,4-Trichlorobenzene	9,200													
Hexachlorobenzene	19													
2-Chloronaphthalene	--													
Hexachloroethane	--													
Hexachlorobutadiene	600													
Hexachlorocyclopentadiene	400													
2,2'-oxybis(1-chloropropane)	--													
Bis-(2-chloroethoxy) methane	--													
Bis-(2-chloroethyl) ether	--													
4-Chlorophenyl-phenyl ether	--													
4-bromophenyl-phenyl ether	--													
3,3'-Dichlorobenzidine	--													
4-Chloroaniline	--													
Organonitrogen Compounds														
Nitrobenzene	--													
Aniline	--													
2-Nitroaniline	--													
3-Nitroaniline	--													
4-Nitroaniline	--													
N-Nitrosodimethylamine	--													
N-Nitroso-di-n-propylamine	--													
N-Nitrosodiphenylamine	--													
2,4-Dinitrotoluene	--													
2,6-Dinitrotoluene	--													
Carbazole	1,600													
Oxygen-Containing Compounds														
Benzoic Acid	--													
Benzyl Alcohol	--													
Dibenzofuran	--													
Isophorone	--													
Phenols and Substituted Phenols														
Phenol	50													
2-Methylphenol (o-Cresol)	--													
4-Methylphenol (p-Cresol)	--													

Units	Screening Value1 µg/kg	CB-1 9/25/07 µg/kg	CB-10 9/25/07 µg/kg	CB-10D 9/25/07 µg/kg	CB-16 9/25/07 µg/kg	CB-17 9/25/07 µg/kg	CB-18 9/26/07 µg/kg	CB-23 9/26/07 µg/kg	CB-32 9/24/07 µg/kg	CB-35 9/24/07 µg/kg	CB-42 9/25/07 µg/kg	CB-48 9/25/07 µg/kg	CB-B 9/24/07 µg/kg	CB-C 9/25/07 µg/kg
2,4-Dimethylphenol	--													
2-Chlorophenol	--													
2,4-Dichlorophenol	--													
2,4,5-Trichlorophenol	--													
2,4,6-trichlorophenol	--													
2,3,4,6-Tetrachlorophenol	--													
Pentachlorophenol	250													
4-Chloro-3-methylphenol	--													
2-Nitrophenol	--													
4-Nitrophenol	--													
2,4-Dinitrophenol	--													
Methyl-4,6-Dinitrophenol 2-	--													
Phthalate Esters[10]														
Dimethylphthalate	--	<1,980	<1,970	<2,030	<1,680	<1,980	**500**	<343	<2,250	<1,680	<2,780	<2,690	<3,440	<1,920
Diethylphthalate	600	<1,980	<1,970	<2,030	<1,680	<1,980	<362	<343	<2,250	<1,680	<2,780	<2,690	<3,440	<1,920
Di-n-butylphthalate	60	<1,980	**2,910**	<2,030	<1,680	<1,980	<362	<343	<2,250	<1,680	<2,780	<2,690	<3,440	<1,920
Butylbenzylphthalate	--	**2,610**	**3,970**	<2,030	<1,680	**3,640**	<362	**2,470**	<2,250	<1,680	**21,600**	<2,690	<3,440	<1,920
Di-n-octylphthalate	--	<4,940	<1,970	<2,030	<1,680	<1,980	<362	<343	<2,250	<1,680	<2,780	<33,600	<13,800	<1,920
bis(2-Ethylhexyl)phthalate	330	26,700	<1,970	<2,030	**1,850**	**28,300**	**1,360**	<343	**6,520**	**3,420**	**45,600**	**16,000**	**19000**	**2210**
Polycyclic Aromatic Hydrocarbons[11]														
Naphthalene	561	<988	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	<1,340	<4,310	<962
2-Methylnaphthalene	200	<988	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	<1,340	**13,500**	<962
Acenaphthylene	200													
Acenaphthene	300													
Fluorene	536	**<988**	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	<1,340	**6,170**	<962
Phenanthrene	1,170	1,780	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	**1,810**	**12,400**	<962
Anthracene	845													
Fluoranthene	2,230	**3,030**	<986	<1,010	<839	<496	**205**	<85.6	<1,130	<840	<1,390	**3,400**	<1,720	<962
Pyrene	1,520	**3,060**	<986	<1,010	<839	<2,480	**248**	<685	<1,130	<840	<1,390	**3,140**	**3,680**	<962
Benzo(a)anthracene	1,050													
Chrysene	1,290	**2,520**	<986	<1,010	<839	<2,480	**273**	<685	<1,130	<840	<1,390	**3,150**	<1,720	<962
Benzo(b)fluoranthene	--													
Benzo(k)fluoranthene	13,000	**1,500**	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	<1,850	<1,720	<962
Benzo(a)pyrene	1,450													
Indeno(1,2,3-cd)pyrene	100	**2,280**	<986	<1,010	<839	<496	**246**	<85.6	<1,130	<840	<1,390	**3,040**	<1,720	<962
Dibenz(a,h)anthracene	1,300	<988	<986	<1,010	<839	<496	<181	<85.6	<1,130	<840	<1,390	<1,340	<1,720	<962
Benzo(g,h,i)perylene	300													
Chlorinated Dioxins and Furans														
2,3,7,8,-TCDD (Toxicity Equivalence Quotient)	--													
2,3,7,8,-TCDD	0.0000091													
2,3,7,8,-TCDF	0.00077													
1,2,3,7,8,-PeCDD	0.0026													
1,2,3,7,8,-PeCDF	0.0026													
2,3,4,7,8,-PeCDF	0.00003													
2,3,4,7,8,-PeCDF	--													

Units	Screening Value1	CB-1 9/25/07	CB-10 9/25/07	CB-10D 9/25/07	CB-16 9/25/07	CB-17 9/25/07	CB-18 9/26/07	CB-23 9/26/07	CB-32 9/24/07	CB-35 9/24/07	CB-42 9/25/07	CB-48 9/25/07	CB-B 9/24/07	CB-C 9/25/07
	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1,2,3,6,7,8,-HxCDD	--													
1,2,3,7,8,9,-HxCDD	--													
1,2,3,4,7,8,-HxCDF	0.0027													
1,2,3,6,7,8,-HxCDF	0.0027													
1,2,3,7,8,9,-HxCDF	0.0027													
2,3,4,6,7,8,-HxCDF	0.0027													
1,2,3,4,6,7,8,-HpCDD	0.69													
1,2,3,4,6,7,8,-HpCDF	0.69													
1,2,3,4,7,8,9,-HpCDF	0.69													
OCDD	23													
OCDF	23													
Total tetrachlorinated dioxins	--													
Total pentachlorinated dioxins	--													
Total hexachlorinated dioxins	--													
Total heptachlorinated dioxins	--													
Total tetrachlorinated furans	--													
Total pentachlorinated furans	--													
Total hexachlorinated furans	--													
Total heptachlorinated furans	--													
Not on Table 3-1														
TPH Diesel[2]	--	**2,120,000**	**726,000**	**534,000**	**204,000**	**424,000**	**92,900**	**80,600**	**1,140,000**	**3,340,000**	**1,580,000**	**1,110,000**	**29,400,000**	**57,100**
TPH Heavy Oil[2]	--	**4,750,000**	**4,590,000**	**3,580,000**	**419,000**	**2,700,000**	**261,000**	**290,000**	**5,310,000**	**3,180,000**	**3,690,000**	**5,580,000**	**5,830,000**	**480,000**
TPH-Gx[1]	--	**10,200**	<5,480	<5,820	<4,770	<5,600	<4,980	<4,830	**8,210**	<9,530	<7,860	**49,000**	**135,000**	<5,630
Total Organic Carbon[3]	--	**96,400,000**	**10,900,000**	**16,000,000**	**7,090,000**	**45,300,000**	**10,800,000**	**6,280,000**	**43,200,000**	**36,800,000**	**67,000,000**	**94,500,000**	**33,000,000**	**10,400,000**
Total Solids[4]	--													

[a] The source of each SLV is documented in Table 3.1 of the Portland Harbor Joint Source Control Strategy, which can be viewed at http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/docs/JSCSFinalTable03_1.pdf

[1] Total Petroleum Hydrocarbons as gasoline-range hydrocarbons (TPH-G) per NWTPH-Gx Method.

[2] Total Petroleum Hydrocarbons as diesel-range hydrocarbons (TPH-D) and oil-range hydrocarbons (TPH-O) per NWTPH-Dx Method.

[3] Total Organic Carbon per EPA method 9060

[4] Total Suspended Solids per EPA method 2540D

[5] Polychlorinated Biphenyls per EPA Method 8082

[6] Mercury per EPA Method 7440

[7] Metals per EPA Method 6010 (except for mercury)

[8] Pesticides per EPA Method 8081

[9] VOCs per EPA Method 8260

[10] Phthalte Esters per EPA Method 8270

[11] PAHs per EPA Method 8270

APPENDIX A: CATCH BASIN DATA REPORTING AND SCREENING TABLE[a]
Data Compiled from Sampling Events conducted by Stantec (2008 and 2010)

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Metals/Inorganics[7]												
Aluminum (pH 6.5 - 9.0)	--	**8,170,000**	**8,330,000**	**129,000,000**	**6,200,000**	NA	**15,500,000**	NA	**11,100,000**	**7,510,000**	**11,000,000**	NA
Antimony	64,000	**15,400**	**13,100**	**4,760**	**1,220**	NA	**5,640**	NA	**30,900**	**8,820**	**2,690**	NA
Arsenic	7,000	**134,000**	**119,000**	**67,500**	**53,600**	**21,900**	**82,600**	**21,400**	**315,000**	**82,700**	**6,430**	**5,300**
Arsenic III	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1,000	**2,140**	**2,610**	**2,480**	**2,420**	**2,900**	**3,080**	**4,000**	**3,140**	**1,700**	**1,190**	**2,200**
Chromium, total	111,000	**150,000**	**66,600**	**71,400**	**30,400**	**36,700**	**85,900**	**77,200**	**142,000**	**97,800**	**42,300**	**87,300**
Chromium, hexavalent	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	149,000	**297,000**	**273,000**	**196,000**	**255,000**	**109,000**	**177,000**	**129,000**	**843,000**	**220,000**	**125,000**	**145,000**
Lead	17,000	**529,000**	**330,000**	**209,000**	**121,000**	**111,000**	**282,000**	**212,000**	**825,000**	**333,000**	**107,000**	**277,000**
Manganese	1,100,000	**496,000**	**361,000**	**456,000**	**442,000**	**392,000**	**462,000**	**445,000**	**575,000**	**480,000**	**346,000**	**388,000**
Mercury[6]	70	**1,790**	<177	<136	<146	**95 (J)**	<183	**130 (J)**	<130	<141	<154	**62 (J)**
Methyl Mercury	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	48,600	**52,500**	**33,600**	**44,200**	**252,000**	NA	**42,400**	NA	**30,000**	**41,000**	**37,700**	NA
Selenium	2,000	NA	NA	NA	NA	1,300	NA	1,100	NA	NA	NA	1,500
Silver	5,000	NA	NA	NA	NA	440 (J)	NA	650 (J)	NA	NA	NA	270 (J)
Zinc	459,000	**1,700,000**	**1,810,000**	**1,180,000**	**1,490,000**	**1,140,000**	**1,180,000**	**1,200,000**	**3,910,000**	**1,420,000**	**1,100,000**	**2,840,000**
Perchlorate	--											
Cyanide	--											
Butyltins												
Monobutyltin	--											
Dibutyltin	--											
Tributyltin	2.3											
Tetrabutyltin	--											
PCBs Aroclors[5]												
Aroclor 1016	530	<45.6	<60.4	<55.1	<61.9	<6.3	<68.5	<10.9	<44.1	<53.0	<61.8	<12.0
Aroclor 1221	--	<91.8	<121	<111	<124	<3.2	<138	<5.5	<88.8	<107	<124	<6.0
Aroclor 1232	--	<45.6	<60.4	<55.1	<61.9	<4.4	<68.5	<7.6	<44.1	<53.0	<61.8	<8.4
Aroclor 1242	--	<45.6	<60.4	<55.1	<61.9	<5.8	<68.5	<10.1	<44.1	<53.0	<61.8	<11.1
Aroclor 1248	1,500	<45.6	210	<55.1	<61.9	<5.6	<68.5	<9.6	<44.1	<53.0	<61.8	<10.6
Aroclor 1254	300	<45.6	<60.4	<55.1	<61.9	<3.4	<68.5	<5.8	<44.1	<53.0	<61.8	<6.4
Aroclor 1260	200	<45.6	<60.4	<55.1	<61.9	<6.8	<68.5	<11.8	<44.1	<53.0	<61.8	<12.9
Aroclor 1262	--	NA	NA	NA	NA	<4.0	NA	<6.8	NA	NA	NA	<7.5
Aroclor 1268	--	NA	NA	NA	NA	<1.8	NA	<3.2	NA	NA	NA	<3.5
Total PCBs	0.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB Congeners		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
All 209 PCB congener target analytes		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3',4,4'-TCB	0.052	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
3,4,4',5-TCB	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,3',4,4'-PeCB	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,4',5-PeCB	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3',4,4',5-PeCB	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2',3,4,4',5-PeCB	0.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3',4,4',5-PeCB	0.00005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,3',4,4',5'-HxCB	0.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,3',4,4',5-HxCB	0.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3',4,4',5,5'-HxCB	0.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3',4,4',5,5'-HxCB	0.00021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,3',4,4',5,5'-HpCB	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorinated Herbicides												
Dalapon	--											
Dicamba	--											
MCPA	--											
Dichlorprop	--											
2,4-D	--											
2,4,5-TP (Silvex)	--											
2,4,5-T	--											
2,4-DB	--											
Dinoseb	--											
MCPP	--											
Organochlorine Pesticides[8]												
α - BHC	--	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
β - BHC	--	<18.4	<60.7	<22.2	<99.6	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
γ - BHC (Lindane)	4.99	<18.4	<60.7	<22.2	<37.3	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
δ - BHC	--	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
Heptachlor	10	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
Heptachlor epoxide	16	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
Aldrin	40	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
Chlordane	0.37	<411	<1360	<497	<557	<22.0	<617	<38.6	<944	<477	<557	<42.3
Endosulfan alpha-	--	<18.4	<60.7	<22.2	<24.9	<22.0	<27.6	<38.6	<44.4	<21.3	<24.9	<42.3
Endosulfan beta-	--	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
Endosulfan sulfate	--	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
DDE	0.33	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
DDD	0.33	<45.9	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
DDT	0.33	<45.9	<121	<55.5	<62.2	<43.1	<68.9	<75.6	<88.8	<53.3	<62.1	<82.8
DDT - total (DDE+DDD+DDT)	0.33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	0.0081	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
Endrin	207	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
Endrin aldehyde	--	<18.4	<60.7	<22.2	<24.9	<43.1	<27.6	<75.6	<44.4	<21.3	<24.9	<82.8
Endrin ketone	--	<18.4	<60.7	<22.2	<62.2	<43.1	<68.9	<75.6	<44.4	<53.3	<62.1	<82.8
Methoxychlor	--	<18.4	<60.7	<22.2	<62.2	<216	<68.9	<379	<44.4	<53.3	<62.1	<415
Toxaphene	--	<548	<1,810	<662	<743	<863	<823	<1,510	<1,330	<636	<742	<1,660
oxy chlordane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
cis - nonachlor	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans - nonachlor	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds[9]												
1,1,1,2- Tetrachloroethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1- Trichloroethane (TCA)	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2- Tetrachloroethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2- Trichloroethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1- Dichloroethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3- Trichloropropane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2- Dichloroethane (EDC)	--	<68.4	<88.8	<81.7	<92.5	<0.28	<102	<0.41	<65.2	<79.1	<92.9	<0.56
cis-1,2-Dichloroethlyene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2- Dichloropropane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2- Dibromoethane (EDB)	--	<68.4	<88.8	<81.7	<92.5	<0.27	<102	<0.39	<65.2	<79.1	<92.9	<0.53
2- Butanone (MEK)	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2- Chloroethyl Vinyl Ether	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2- Hexanone	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4- Methyl-2-Pentanone (MIBK)	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acrolein	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acrylonitrile	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethylene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromomethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iodomethane (Methyl Iodide)	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	--	**3,260**	<355	<327	<370	<0.44	<408	**0.69 (J)**	<261	<316	<372	**<0.87**
Methylene chloride	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,4-Dichloro-2-butene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	--	**69.8**	<35.5	<32.7	<37.0	**0.33 (J)**	<40.8	**0.94 (J)**	<26.1	<31.6	<37.2	**1.1 (J)**
EthylBenzene	--	**3,070**	<88.8	<81.7	<92.5	**0.81 (J)**	<102	**9.5**	<65.2	<79.1	<92.9	**2.3 (J)**
m,p-Xylene	--	NA	NA	NA	NA	**3.3 (J)**	NA	**39.3**	NA	NA	NA	**80. (J)**
o-Xylene	--	NA	NA	NA	NA	**0.87 (J)**	NA	**18.8**	NA	NA	NA	**2.7 (J)**

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Xylenes (total)	--	**18,300**	<178	<163	<185	**4.2 (J)**	<204	**58.1**	**207**	<158	<186	**1.7 (J)**
Methyltert-butyl ether	--	<54.7	<71.0	<65.3	<74.0	<0.32	<81.6	<0.46	<52.2	<63.3	<74.3	<0.63
Tetrachloroethene (PCE)	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	--	**1,320**	<88.8	<81.7	**257**	**1.8 (J)**	**512**	**234**	<65.2	<79.1	**3,090**	**60.5**
trans-1,2-Dichloroethene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds												
Halogenated Compounds												
1,2-Dichlorobenzene	1,700											
1,3-Dichlorobenzene	300											
1,4-Dichlorobenzene	300											
1,2,4-Trichlorobenzene	9,200											
Hexachlorobenzene	19											
2-Chloronaphthalene	--											
Hexachloroethane	--											
Hexachlorobutadiene	600											
Hexachlorocyclopentadiene	400											
2,2'-oxybis(1-chloropropane)	--											
Bis-(2-chloroethoxy) methane	--											
Bis-(2-chloroethyl) ether	--											
4-Chlorophenyl-phenyl ether	--											
4-bromophenyl-phenyl ether	--											
3,3'-Dichlorobenzidine	--											
4-Chloroaniline	--											
Organonitrogen Compounds												
Nitrobenzene	--											
Aniline	--											
2-Nitroaniline	--											
3-Nitroaniline	--											
4-Nitroaniline	--											
N-Nitrosodimethylamine	--											
N-Nitroso-di-n-propylamine	--											
N-Nitrosodiphenylamine	--											
2,4-Dinitrotoluene	--											
2,6-Dinitrotoluene	--											
Carbazole	1,600											
Oxygen-Containing Compounds												
Benzoic Acid	--											
Benzyl Alcohol	--											
Dibenzofuran	--											
Isophorone	--											
Phenols and Substituted Phenols												

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Phenol	50											
2-Methylphenol (o-Cresol)	--											
4-Methylphenol (p-Cresol)	--											
2,4-Dimethylphenol	--											
2-Chlorophenol	--											
2,4-Dichlorophenol	--											
2,4,5-Trichlorophenol	--											
2,4,6-trichlorophenol	--											
2,3,4,6-Tetrachlorophenol	--											
Pentachlorophenol	250											
4-Chloro-3-methylphenol	--											
2-Nitrophenol	--											
4-Nitrophenol	--											
2,4-Dinitrophenol	--											
Methyl-4,6-Dinitrophenol 2-	--											
Phthalate Esters[10]												
Dimethylphthalate	--	<1,490	<12,100	<2,200	<2,520	<280	<4,400	<320	<1,410	<2,130	<4,910	<540
Diethylphthalate	600	<1,490	<12,100	<2,200	<2,520	<400	<4,400	<450	<1,410	<2,130	<4,910	<760
Di-n-butylphthalate	60	<1,490	<12,100	<2,200	<2,520	<370	<4,400	<420	<1,410	<2,130	<4,910	<710
Butylbenzylphthalate	--	<1,490	<12,100	<2,200	<2,520	<310	**10,900**	**1,000 (J)**	<1,410	2,260	<4,910	**1,600 (J)**
Di-n-octylphthalate	--	<1,490	<12,100	<2,200	<2,520	<260	<4,400	**640 (J)**	<1,410	<2,130	<4,910	**1,800 (J)**
bis(2-Ethylhexyl)phthalate	330	**9,630**	**41,700**	**11,200**	**9,280**	<3,600	**35,900**	**13,900**	**7,710**	**7,890**	**77,800**	**13,500**
Polycyclic Aromatic Hydrocarbons[11]												
Naphthalene	561	**23,300**	<1,210	<550	<629	**21.5 (J)**	<1,110	**55.3**	**761**	<533	<614	**70.8**
2-Methylnaphthalene	200	NA	NA	NA	NA	**22.0 (J)**	NA	**64.9**	NA	NA	NA	**58.3**
Acenaphthylene	200	<558	<1,210	<550	<629	**4.6 (J)**	<1,110	**17.2 (J)**	<352	<533	<614	**15.8 (J)**
Acenaphthene	300	**1,490**	**1,710**	**1,100**	**946**	**19.4 (J)**	<1,110	**33.7 (J)**	**550**	<533	<614	**16.3 (J)**
Fluorene	536	**3,610**	**6,030**	**2,770**	**1,770**	**19.8 (J)**	<1,110	**68.1**	**1,060**	**700**	<614	**40.1 (J)**
Phenanthrene	1,170	**9,090**	**16,600**	**8,820**	**5,140**	**183**	**3,010**	**371**	**4,590**	**3,580**	**2,290**	**236**
Anthracene	845	**917**	<4,240	**819**	<629	**41.9**	<1,110	**62.3**	**508**	<533	<1,230	**30.6 (J)**
Fluoranthene	2,230	**1,720**	**1,300**	**1,360**	**1,820**	**262**	**4,270**	**712**	**754**	**1,330**	**1,440**	**382**
Pyrene	1,520	**2,970**	**2,930**	**6,030**	**3,220**	**208**	**5,700**	**708**	**3,100**	**4,640**	**2,560**	**393**
Benzo(a)anthracene	1,050	**1,100**	<1,210	**2,620**	<629	**82.1**	**2,890**	**266**	**1,130**	**1,830**	**616**	**133**
Chrysene	1,290	**1,780**	**2,060**	**6,080**	**972**	**117**	**3,920**	**547**	**2,860**	**3,850**	**1,360**	**282**
Benzo(b)fluoranthene	--	**578**	<1,210	**1,440**	**635**	**83.5**	**3,020**	**506**	**875**	**1,150**	**1,020**	**224**
Benzo(k)fluoranthene	13,000	**415**	<1,210	**589**	<629	**96.9**	**2,480**	**424**	**402**	**565**	**750**	**175**
Benzo(a)pyrene	1,450	<372	<1,210	**1,670**	<629	**102**	**3,400**	**419**	**918**	**1,380**	**683**	**173**
Indeno(1,2,3-cd)pyrene	100	<372	<1,210	**551**	<629	**59.8**	**2,190**	**303**	**403**	**573**	**685**	**109**
Dibenz(a,h)anthracene	1,300	<372	<1,210	<550	<629	**22.1 (J)**	<1,110	**135**	<352	<533	<614	**45.9 (J)**
Benzo(g,h,i)perylene	300	**667**	<1,210	**922**	<629	**72.8**	**2,750**	**366**	**749**	**1,150**	**1,100**	**176**
Chlorinated Dioxins and Furans												
2,3,7,8,-TCDD (Toxicity Equivalence Quotient)	--											
2,3,7,8,-TCDD	0.0000091											
2,3,7,8,-TCDF	0.00077											

	Screening Value1	WC-SED-1 5/28/08	WC-SED-2 5/28/08	WC-SED-3 5/28/08	WC-SED-4 5/28/08	WC-SED-4 8/11/10	WC-SED-5 5/28/08	WC-SED-5 8/11/10	WC-SED-6 5/28/08	WC-SED-7 5/28/08	WC-SED-8 5/28/08	WC-SED-8 8/11/10
Units	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
1,2,3,7,8,-PeCDD	0.0026											
1,2,3,7,8,-PeCDF	0.0026											
2,3,4,7,8,-PeCDF	0.00003											
2,3,4,7,8,-PeCDF	--											
1,2,3,6,7,8,-HxCDD	--											
1,2,3,7,8,9,-HxCDD	--											
1,2,3,4,7,8,-HxCDF	0.0027											
1,2,3,6,7,8,-HxCDF	0.0027											
1,2,3,7,8,9,-HxCDF	0.0027											
2,3,4,6,7,8,-HxCDF	0.0027											
1,2,3,4,6,7,8,-HpCDD	0.69											
1,2,3,4,6,7,8,-HpCDF	0.69											
1,2,3,4,7,8,9,-HpCDF	0.69											
OCDD	23											
OCDF	23											
Total tetrachlorinated dioxins	--											
Total pentachlorinated dioxins	--											
Total hexachlorinated dioxins	--											
Total heptachlorinated dioxins	--											
Total tetrachlorinated furans	--											
Total pentachlorinated furans	--											
Total hexachlorinated furans	--											
Total heptachlorinated furans	--											
Not on Table 3-1												
TPH Diesel[2]	--	**6,670,000**	**15,800,000**	**4,540,000**	**3,470,000**	**20,400 (J)**	**1,780,000**	**1,740,000**	**2,800,000**	**2,670,000**	**5,560,000**	**914,000**
TPH Heavy Oil[2]	--	**3,990,000**	**8,060,000**	**8,030,000**	**1,720,000**	**196,000**	**4,920,000**	**8,340,000**	**4,030,000**	**4,340,000**	**7,600,000**	**5,550,000**
TPH-Gx[1]	--	**677,000**	**223,000**	**17,500**	**83,500**	**4,900 (J)**	**14,500**	**15,500 (J)**	**27,700**	**21,600**	**11,000**	**4,800 (J)**
Total Organic Carbon[3]	--	NA	NA	NA	NA	**13,300,000**	NA	**62,300,000**	NA	NA	NA	**100,000,000**
Total Solids[4]	--											

[a] The source of each SLV is documented in Table 3.1 of the Portland Harbor Joint Source Control Strategy, which can be viewed at http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/docs/JSCSFinalTable03_1.pdf

[1] Total Petroleum Hydrocarbons as gasoline-range hydrocarbons (TPH-G) per NWTPH-Gx Method.

[2] Total Petroleum Hydrocarbons as diesel-range hydrocarbons (TPH-D) and oil-range hydrocarbons (TPH-O) per NWTPH-Dx Method.

[3] Total Organic Carbon per EPA method 9060

[4] Total Suspended Solids per EPA method 2540D

[5] Polychlorinated Biphenyls per EPA Method 8082

[6] Mercury per EPA Method 7440

[7] Metals per EPA Method 6010 (except for mercury)

[8] Pesticides per EPA Method 8081

[9] VOCs per EPA Method 8260

[10] Phthalte Esters per EPA Method 8270

[11] PAHs per EPA Method 8270